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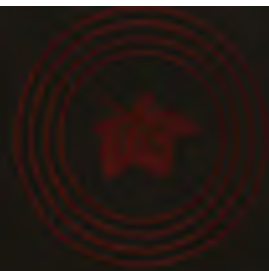
Tree Gossip



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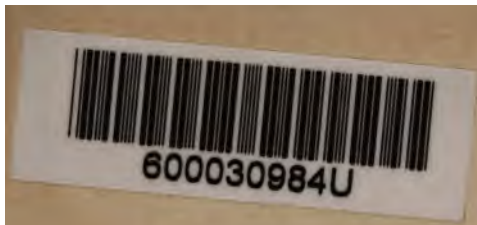
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TREE GOSSIP.

TREE GOSSIP.

BY

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EDITOR OF

THE NEW EDITION OF GILPIN'S "FOREST SCENERY."

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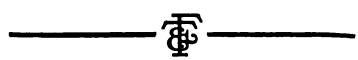
"OUR WOODLAND TREES," "SYLVAN SPRING," "AUTUMNAL LEAVES,"
"THE FERN PORTFOLIO," "THE FERN WORLD," "THE FERN PARADISE,"
"TREES AND FERNS," "WHERE TO FIND FERNS," "MY GARDEN WILD,"
"BURNHAM BEECHES," "THE ENGLISH PEASANTRY,"
"PEASANT LIFE," ETC.



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PREFACE.

THIS little volume might have been greatly extended if it had been designed to include gossip upon the most easily accessible facts of tree life. But it is intended to deal, in a popular manner, with subjects outside those usually discussed in books on trees. It is concerned, in short, mainly, with the byeways of tree life. The general subject has attractions for a very large public—larger now than ever before; for trees were never so much valued and loved as they are in the present day—and the Author trusts that the particular phase of it discussed in the following pages, and the method of discussion, may please and interest his readers.

The alphabetical arrangement of the contents has been adopted for convenience of reference.

F. G. H.

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TREE GOSSIP.

Age.

O remarkable is oftentimes the duration of tree life, that the question of Age becomes a very interesting one. But how is Age determined? In exogenous trees, or those whose additions to substance take place outwards, annual growth in bulk is shown by a series of concentric 'rings;' so that by cutting the trunk across and counting these rings the growth in years is indicated. Unfortunately this test of Age can only be applied after the tree is cut down, and only a rough approximation, therefore, can be made to it when a tree is standing in its glory and beauty. Yet it is interesting to know, even so late, how long

has been the period of existence. The register of Age, however, is curiously irregular, and is affected by many different circumstances—the growth in successive seasons being affected by these circumstances, and the width of the rings being wider or narrower, according to the more or less favourable conditions of growth during the periods corresponding respectively to the rings. Cold and warmth, drought and moisture, supply the most important reasons for the difference. The absence or the crowding of other trees; the reaching by the roots, at certain stages of growth, of a greater or less amount of nutriment; atmospheric changes occasioned by the proximity or otherwise of populations, are amongst other causes which affect tree development. The variation may be instanced in the case of a Scotch Fir cut down at the Age of two hundred and seventy-two years. The cut across the trunk was at a height of five feet from the ground, and the radial width of the first set of rings, corresponding to the first ten years, was 0·36 of an inch. The width for the next ten was 0·51 of an inch; for the third ten, to thirty years, 0·60 of an inch; for the ten completing forty years, 0·28 of an inch. The greatest radial width of its annual growth was for the ten years which completed its fiftieth year, in which period the radial width was 2·11 inches. In the next ten the

increase was 2·06 inches; in the succeeding fifty years respectively, 1·74, 1·70, 1·21, 1·53, and 1·25 inches. At this time the tree had reached its hundred and tenth year. During the next five decades the increase is shown by the following figures:—0·56, 0·96, 1·22, 0·92, and 1·03, representing radial width. Succeeding this period of fifty years the progress was, during each ten years, 1·04, 0·93, 0·62, 0·90, and 1·37. From its two hundred and tenth to its two hundred and twentieth year the radial increase in inches was 1·62; and for the succeeding fifty years the results were 1·14, 0·98, 1·59, 1·08, and 0·92. The last quotation of increase, 0·92, took place during the ten years which completed the two hundred and seventieth year of this Scotch Fir. Two years after, it was cut down, and the radial width of the wood made in the two years was 0·14 of an inch. As a proof that the warmth or coldness, the moisture or drought of a season influences the development of the annual layer of wood, a statement furnished to the author by Mr. Paterson, of Hunstrete, near Bristol, and published in *Forestry*, may be mentioned. In May, 1883, an Oak was cut across at fourteen feet from the ground, and at that part one hundred and ninety-two concentric rings were counted. On the probable supposition that this tree had taken the first twenty years of its growth to reach the height at which it

was cut across, its Age was calculated to be two hundred and twelve years, and the date of planting must therefore have been 1670. Dividing the rings into sections corresponding to the several periods of its growth, the breadth of the rings in the sections was as follows:—In the section corresponding to the years 1691 to 1710 inclusive, twenty years, $2\frac{14}{16}$ inches; 1711 to 1730, twenty years, $3\frac{6}{16}$ inches; 1731 to 1734, four years, $\frac{12}{16}$ of an inch; 1735 to 1742, eight years, $\frac{7}{16}$ of an inch; 1743 to 1750, eight years, $\frac{11}{16}$ of an inch; 1751 to 1770, twenty years, $2\frac{11}{16}$ inches; 1771 to 1790, twenty years, $2\frac{4}{16}$ inches; 1791 to 1810, twenty years, $2\frac{10}{16}$ inches; 1811 to 1830, twenty years, $2\frac{6}{16}$ inches; 1831 to 1850, twenty years, $1\frac{11}{16}$ inches; 1851 to 1870, twenty years, $1\frac{5}{16}$ inches; 1871 to 1882, twelve years, $\frac{7}{16}$ of an inch. Mr. Paterson drew the inference that the period of slowest growth, 1735–1742, must have been a period of exceptional weather, and in a further communication to the author he gave evidence of the correctness of his surmise by showing that a season of great cold was included within it. In 1740, according to a published statement, 'the snow lay eight and ten feet deep in Spain and Portugal. The Zuyder Zee was frozen over, and many thousand persons walked and skated on it. At Leyden the thermometer fell 10° below zero of Fahrenheit's scale. All the

lakes in England froze; and a whole ox was roasted on the Thames. Many trees were killed by the frost, and postilions were benumbed in their saddles.' Yet sometimes the difference in the width of the rings in a tree is difficult to account for, as is instanced in the case of a Larch which was cut down in Scotland. The rings of this tree were on one side double the width of those on the other, and the widest rings were on the north side of the tree, that is, on the least warm, the least sunny, and the least genial side.

Ailantus.

SWEETNESS of smell, in leaf or flower, and beauty of colour of flower or fruit, have distinct purposes in the wise economy of nature, and are apparently—this is a favourite and very generally accepted theory—intended to promote, first, the fructification of the reproductive organs; and, next, the distribution of the seed. Sweet-smelling and gaily coloured flowers attract insects, and thus make them unconscious bearers of pollen dust; and the bright colours and sweet flavours

of fruits cause birds to eat them and carry them about, and thus to distribute the indigestible but fructuous seed. What office, however, is performed by flowers which are so ill-smelling that they are offensive both to human beings, to birds, and to insects? These remarks have been suggested by the Ailantus—a very familiar tree, whose handsome pinnate leaves, not unlike in form those of the common Ash, grow sometimes to a height of six feet, but whose odour, both of leaf and flower, is most offensive. Nearly all insects avoid it, and one wonders, we repeat, what office is performed by its offensiveness.

Amber.

IT is, perhaps, not generally known that Amber comes from Pine Trees, being indeed a species of petrified resin. The Baltic coasts proved the chief European supply. There, along the shore, it is found buried, and its presence underground might afford a fair presumption to those who do not look deeply into things, that it was a mineral. But we know that along the coasts under the soil

of which yellow Amber is buried, there once grew a great forest of Pine Trees, and it is from their deposits of resin that Amber is obtained. In the United States it has been found at Cape Sable, in Maryland. The most common kind is the yellow sort used so very extensively for cigar mouth-pieces, rosaries, beads, and other articles of ornament or utility. Its vegetable origin would, indeed, be indicated by the constituents of which it is composed. These include, of carbon—a large constituent of all vegetable substances—78·82 per cent.; of oxygen, 10·90 per cent.; and of hydrogen, 10·23 per cent. It is so light that it floats in water, and where it has, doubtless, been washed out of the bed of the shore, it has been picked up in the sea. Indeed, on the coasts off Konigsberg it has proved so abundant as to make it remunerative for steamboats to be engaged in the trade of collecting it—the pieces of Amber being fished out of the sea by nets. The Amber of the Prussian coasts, in fact, has produced a revenue of as much as £25,000 per annum merely in royalty paid to the Government. Off the coasts of Sicily, too, Amber used to be found, but the supply has been exhausted. It is an interesting fact that, though Amber is without taste and without smell in the form in which we usually see it, yet if pounded or heated it will emit a fragrant odour, like many other vegetable substances which give out perfumes when bruised.

'Arbor Days.'

ALMOST excellent and admirable means of inducing the cultivation of plants in countries where extended planting has been deemed necessary, is that of offering rewards for the putting in of trees, and also of appointing especial days for planting. In 1868 a law was made in California by which the Board of Supervisors of each county was authorized to induce owners of land to plant and cultivate trees upon it, to give directions as to the times and methods of planting, the ages of the trees, the means of protection from injury, etc., and to bestow, after a certain period—four years—from planting, rewards for the successful issue of the operation. As much as £1 was given for each tree thus successfully planted, and the following trees were especially recommended for the purpose :—Almond, Apple, Ash, Cherry, Chestnut, Cypress, Elm, Eucalyptus, Fig, Gum, Honey Locust, Larch, Laurel, Maple, Mulberry, Orange, Pear, Pines, Plum, Poplar, Redwood, Spruce, Tulip-tree, and Walnut. The Board recommended also that the age for planting should be from three to eight years, and the space between each tree should be not less than twelve feet. The month of May, 1883, was celebrated in Canada by the commence-

ment of a movement which we shall hope to see extended. A prettily embellished paper reached us from Quebec which notified the institution of an 'Arbor Day.' It was forwarded to us by Mr. W. W. Lynch, Commissioner of Crown Lands, and was dated the 20th of April, 1883. The Commissioner said, 'The following pages contain what has been done in the province of Quebec towards the establishment of "Arbor Day." I have nothing to add, except to express the earnest hope that the movement now inaugurated may have for its happy result to create an interest among our people generally in this undertaking, which has proceeded so admirably elsewhere, and which, if persevered in, is certain to redound to the welfare of the province now and for all time to come.' The Commissioner added, 'If "Arbor Day" becomes one of our institutions, the credit is largely due to the Hon. Mr. Joly, whose efforts in its behalf have been untiring; and I desire here to express my personal gratitude for the assistance he has so generously rendered me in the discharge of my official duties in connection with it.' 'Arbor Day' is a day to be observed for the planting of forest trees; and its observance is authorized by section 4 of the Act (48 Vict., cap. 13) 'To encourage the planting of forest trees;' an Act which empowers the Lieutenant-Governor of Canada to

appoint by proclamation the day to be observed as 'Arbor Day.' It has already become an institution in parts of the United States, and the forest trees planted on the occasions indicated can already, it is stated, be counted by millions. Not only adults, but children attending schools, are invited and encouraged to plant trees on 'Arbor Day.' In a letter written by Mr. Joly (who has already been referred to) to the Superintendent of Public Instruction, the former said, 'I venture to hope that the Council of Public Instruction will readily recommend all the educational establishments to grant a holiday on the day fixed by his Honour the Lieutenant-Governor, as "Arbor Day," the holiday to be devoted to transplanting trees on to the lands belonging to such establishments, or upon any other lands that may be deemed proper.' The Lieutenant-Governor, by proclamation dated the 12th of April, 1883, fixed the 7th day of May in the same year as 'Arbor Day' for the Western Division of the Province of Quebec, and the 16th of May for the Eastern Division, for deciduous trees.

Ash and Elder.

UNDER old beliefs, the Elder was regarded as a cure for erysipelas, if an amulet made in a particular way of an Elder twig were used. The Ash was a prognostic of luck, and an Ash leaf with leaflets even in number—an abnormal state of things—was especially lucky. It was customary to say, in plucking such a leaf:—

'Even-Ash, I thee go pluck,
Hoping thus to meet good luck;
If no luck I get from thee
I shall wish I left thee on the tree.'

Autumn Tinting.

DELIGHTFUL and refreshing to the eye as is the greenness of foliage, we should tire, perhaps, of the ceaseless repetition of an unvarying hue, were our trees, shrubs, and humbler plants clothed at all seasons alike. And yet, even in what the undiscriminating onlooker regards as nothing but green, there are a thousand variations of shade and arrangement—each shade depending for its

particular hue upon circumstances of growth and accidents of light. These change with the seasons and again produce variety that is ever beautiful to the lover of nature. The soft, tender, golden hue of spring, when first the cosy covering of waterproof scales, falling away, discloses the virgin richness of the young leaf, merges soon into the florid depth of the summer colouring. To the close observer there is no sameness, even in what, to the unobservant, may seem to be uninteresting uniformity. But in Autumn all must find beauty in the marvellous change which makes the green of summer blossom into the colours of the rainbow. The loveliness of Autumn has, indeed, as every one knows, formed the theme of generations of poets, who have eloquently touched upon the far-reaching splendours of autumnal woods, when bathed in glowing colours. But it is mostly either the pervading gorgeousness of particular hues—

'Then came the Autumn, all in yellow clad,'

as Spenser exclaims, or the ripening and fruitful character of the season, as described by Keats, when he says—

'Season of mist and mellow fruitfulness!
Close bosom-friend of the maturing sun;
Conspiring with him how to load and bless
With fruit the vines that round the thatch-eaves run;
To bend with apples the moss'd cottage trees,
And fill all fruit with ripeness to the core.'

It is, we say, the conspicuous phase of Autumn that has caught the general attention, and not the especial charm of the early season, when, though no gorgeous masses of particular colour arrest the eye that delights in great displays and contrasts produced on a large scale, the subtle differences of individual leaves constitute a beauty which, for striking and delicate loveliness, is unrivalled at any other season. It is strange that, in spite of the singular attractiveness of the subject, this especial phase of the beauty of the season of the fall should have almost escaped the notice of poets and *prosateurs*, who have preferred to descant on the more obvious features of Autumn. Much of this earlier loveliness is, it is true, almost hidden away, or at least concealed, from the careless saunterer through country lanes or autumnal woods. At the distance of a yard or two a tree or shrub may seem to be just mellowing, as if touched with sunlight. The depth of the summer green is passing away under the influence of a scarcely perceptible golden halo, and the circumstance is noticeable only as the first indication of the coming change, which, when completed, will light up the whole tree or bush with golden glory. But this almost uniform colouring—as it appears—is made up, as any one may find who will take the trouble to closely approach and peer in among the branches,

of a thousand variations of hue; for not only do different leaves vary in their markings, but one part of a leaf varies from another part. Everywhere there is change and contrast, though on so small a scale that it can only be seen by the close and attentive observer. Science has not yet fully revealed to us the exact cause of the varied colourings of plants. It has been discovered that the matter called chlorophyll, the agent which, in conjunction with the action of light, produces the colour green, is not the only colouring substance in plants, for there are various substances of similar nature, which, under similar action, produce various colours. The Autumn tinting of leaves, however, is not occasioned, as is the case with the colouring of flowers, by the healthy functions of the plant tissues, but by a retardation of those functions. It is the early manifestation of decay. The activity of the sap is being lessened; the vigorous forces of spring and summer are decreasing. The daily exhalation of oxygen, that makes the neighbourhood of trees so healthful, and performs so useful and beautiful an office in the economy of nature, is ceasing. The excess of oxygen, the semi-stagnation of the vascular system, the action of sunlight upon the chromophyll (as the various colouring matters are collectively called) combined, possibly, with its action upon other chemical substances absorbed by

the roots—all these physiological circumstances and processes contribute to the effects which are so beautifully shown through the various stages, in the exquisite colouring of autumnal leaves. But it is not our purpose to discuss in detail the causes of these beautiful phenomena, but to note the effects, and to call attention to the fact that the most beautiful of these effects have been almost wholly ignored, or if noticed, noticed by but very few persons amongst those who are lovers, yet not students, of nature. Of the various theories propounded to explain the cause of the beautiful and varying changes of colour in the foliage of leaves towards Autumn, the one generally accepted is, as we have shown, that the yellow and red hues are occasioned by the over-oxydation of the leaf tissues. Plant-leaves through their stomata, or breathing pores, absorb oxygen from the air at night, and, under the influence of light, give off oxygen, after assimilating the carbon of the carbonic acid they inspire during the daytime. But towards Autumn, when the period of existence of deciduous leaves is drawing to a close, the healthy functions of the leaf organs begin to relax ; the vascular system is getting deranged ; carbonic acid is still absorbed, but the oxygen of the compound is not given back to the air again as freely as before. There is an over-accumulation of oxygen, and the result is, first, a

yellowing, and then (in leaves that appear to have the power of accumulating more oxygen than the leaves whose final stage of colouring is yellow) a reddening. That the oxygen *per se* causes the yellow and red hues is proved by the immersion of yellow or red Autumn leaves in an alkali, or by exposing them, under a glass receiver, to an atmosphere of ammonia. The leaves then return to their green colour ; and as a proof that it is by contact with the chromophyll, or colouring pigment, that the change is effected, the leaf is rapidly or slowly changed in colour according as the leaf cuticle is porous, or horny, hard and impervious. The oxygen in the pigment chemically combines with the ammoniac base, and thus, losing its specific character, loses its colouring power. If the leaves are kept under the influence of the alkali more than the time necessary to restore the green colour, they gradually turn brown, but if quickly removed from its influence so soon as the green colour comes back, they will remain green sometimes for hours. Chemical substances absorbed from the roots have, possibly, something to do with the colouring of autumn leaves. Some of them precipitate, so to speak, earthy matters both in the leaf tissues and at the base of the leaf stalks, where the disruption of the leaf takes place at the fall. Probably the blocking up of the cells (which are

multiplied, and hence more numerous and densely packed towards Autumn) at the base of the leaf stalks by these earthy matters, prevents the passage of oxygen from the leaves—which are the plant's principal oxygen collectors—to the rest of the plant, causing the congestion of the leafy tissues by oxygen, and assisting in that brilliant display of colour which marks the season of Autumn and heralds the decay of foliage. The variety of tinting and the delicate and bold gradations of colouring to be found in these leaves in the fall of the year are marvellous. It would be going quite beyond our limits to enumerate or describe them all, even if it were possible; but a brief description must be at least given. Few persons are aware of the great beauty of the Oak, Birch, and Elm foliage at the season which precedes the final autumnal colouring, when the departing green is delicately touched with gold and bronze and brown, and oftentimes with red, disposed in every manner of ways upon the leafy surface, sometimes blotched or splashed or suffused with the foreign invading colour at the edges, sometimes at the top or bottom, or on one side only of the leaf. In each leaf the character of the venation affects the disposition and appearance of the colouring; yet no leaves on the same tree are like each other when once the tinting has commenced, and during

the whole period preceding that at which the final stage of uniform colouring is reached. As a shrub, the common or Field Maple often makes dense hedges which glow in Autumn with rich colour—yellow, inclining to golden, purple, bronze, and bright rich red. But here, as elsewhere, the early season is the most beautiful when the green lingers amongst the rich invading hues. Green, gold, and bronze on the same leaf may often be seen; or green and bronze edged with purple; a gold or orange centre, with green surroundings, or the reverse; great green spots in the midst of pale straw colour, or straw-coloured spots scattered over the green. These are but a few of the numberless variations in the arrangement of the colouring of the autumnal Maple foliage in the early season. Of hedge shrubs the Hawthorn and Dogwood are amongst the richest in their Autumn Tinting. Purple, bronze, crimson, golden, dark green, and golden green, and bright green, are the hues of the first-named, spread in every conceivable way upon the glossy tissue of this beautiful hedge shrub. A fine glow of purple is the distinguishing tint of the Dogwood when its autumnal flush is at its height; but in the early seasons, golden bars, splashings, and spots across the purple, or purple markings upon pervading yellow, or green and purple and golden intermingled in exquisite variety, are

common in hedgerow and coppice. The Guelder Rose vies with the Dogwood in its empurpling beauty: golden lines, like sunshine down green alleys, brighten the fading leaves of the Horse Chestnut: the White Beam tissue, long before the normal green has gone, glows with bands, spots, and other markings of fiery brown: an almost fiery radiance gleams out from the bright green leaves of the Plane: the 'twinkling' Birch leaves light up with radiance the graceful twigs on which they dance with the slightest breath of wind: the Willow and the Poplar are spotted, freckled, and dashed as with precipitated sunshine; and last, but not least, the beautiful Bramble, the 'commonest' of all, shows colouring which, for richness and variety, stands unrivalled. Purple, crimson, and green are often richly spread even upon the stems of the Bramble; and the green, red, and black fruit, the white, delicately flushed blossom, the green, purple, crimson, golden and bronze foliage, mingled in endless variety, often upon one and the same shrub, present features of loveliness that must indeed be seen to be fully appreciated. We can only, as we have said, touch lightly upon this subject, but we trust our readers will study it for themselves; and they will hardly, we think, find a better field for this purpose than the delightful woodlands of our beautiful New Forest. Let those who may

wish to do so, start towards the end of September, or early in October, and we can give them a route —the one we ourselves have taken—a route than which they will hardly find a better. If, beginning at Brockenhurst—one of the most delightful of forest villages—an exploration of its sylvan riches be first attempted, it will be worth while to make a pilgrimage to Boldre, the home for so many years of the genial author of 'Forest Scenery,' William Gilpin, who lies in the graveyard of the pretty little church of that forestal village under the shadow of his favourite Maple. Then, returning to Brockenhurst, let the route be to Ringwood, by way of the leafy depths of Burley; then away up the Avon valley, passing sweet little Ibbesley, to Fordingbridge. From there the pedestrian should make for Bramshaw, looking at Autumn from Bramble Hill, that rises from the sylvan depths of Bramshaw. Thence, in journeying to Stoneycross, he must not forget to explore Canterton Glen, where Rufus met his death. From Stoneycross he should journey to Lyndhurst, from which, before following the forest road back to Brockenhurst—perhaps the finest forest road in England—he may diverge to the sylvan shades of Boldrewood and Mark Ash.

Baobab.

'FROM the Cedar of Lebanon to the hyssop that springeth out of the wall,' was an expression of Solomon to indicate extremes of comparison. From the Baobab of Africa to the mallow of our lanes and fields might be used as a similar indication of vegetable extremes. But the humble and familiar mallow, with its stores of edible 'cheeses,' well known to every country child, is actually related to the colossal Baobab tree with its store of 'monkey's bread.' There are a large number of plants in the vegetable world of the mallow kind, and they furnish gradations which link them to the great and in every way wonderful African tree which, taking its designation from Michael Adanson, the traveller, is called botanically *Adansonia digitata.* Forming a perfect dome of vegetation, like a little wood in itself, the Baobab rears its colossal form in the forest. The trunk varies in height, being sometimes only fifteen feet and at other times sixty feet high, but it is as much, oftentimes, as seventy-five feet in circumference! From it a large number of enormous limbs are given off at a broad angle—thus extending outwards and covering a large space of ground. Sometimes this horizontal extension of limbs

reaches a distance of sixty feet from the trunk, the branches often touching the ground and concealing the trunk from view. In these enormous branches there is not the usual gradation from base to apex observable in most branches, but a great uniformity of thickness throughout. The leaves of the Baobab, and the flowers—monster floral productions of purplish white—are on the same gigantic scale as the whole of the tree. The flowers appear about the month of July, and the resulting juicy fruit, like large cucumbers, is filled with an agreeable pulp and with edible seeds which delight the whole monkey tribe, and are sought after by the human inhabitants of the regions where the Baobab grows. The juice mixed with water, or taken without and sweetened, makes a pleasant and desirable drink. A species of cord is made from the bark, but the wood is of little use, being soft and spongy. The marvellous thing about the Baobab, next to its enormous size, is its remarkable vitality. It is, in fact, most tenacious of life. If blown down or cut down, it does not die, for it will continue growing *on* the ground. Even when the hollow trunk is used for lighting fires, the tree is not killed. It leads a charmed existence, living, it is believed, to the age of sometimes fourteen hundred years, and is altogether, in every sense, one of the wonders of the vegetable world.

Beautifying a Town.

AN interesting account was published in an Australian paper some time ago, of some efforts made by the Jamestown Corporation to plant trees in their streets; and it was especially interesting and positively refreshing to read how pluckily the Jamestown Corporation withstood, in their public-spirited efforts to beautify their little town, the insidious attempts of 'interested' persons to upset the projected reform. It was advanced, for instance, on the part of 'Jones,' who kept an hotel at one corner of the main street, that if a double avenue of green trees were formed down that street he would 'be unable to check, from the inside of his bar window, the number of thirsty souls who, while in arrear to him, patronised, on the cash principle, the rival hotel at the other corner,' kept by 'Robinson.' Let not the reader imagine that this is a ludicrous illustration of the miserable smallness of mind that prompts individual resistance, for the most miserable of selfish motives, to great public reforms. A fine illustration of a conceited man is the one that has likened him to a man standing on the top of a mountain, to whom the world appears very small, but who forgets how very much smaller he appears

to the world. Similarly a selfish man is quite unable to see, from the isolated position in which he places himself—outside all the broad and sympathetic feelings of large-hearted people—how ludicrous his selfishness appears to others.

Birch.

FEW trees are more hardy, more graceful, and more generally useful than the Birch. So hardy is it that it is the last seen northwards of the species of trees inhabiting the region towards the North Pole, and upon exposed mountain sides it flourishes bravely and luxuriantly. And who can deny the exceeding beauty of the tender, delicate, and really charming spray, and of the pretty, serrated, gracefully formed leaves? Of its uses the number is far too large to recapitulate. All kinds of domestic purposes it serves. In some parts of the Highlands of Scotland almost every household utensil is made of Birch wood. Even candles are made of the bark. In Sweden, in times of scarcity, its bark has been made into food. In Poland and in Russia it is used for a multitude

of things, and the perfume of its bark gives to Russian leather its peculiar and very pleasant perfume. Even wine is made from the sap of the Birch, and its smoke is said to impart a fine flavour to ham. Its use as a means of punishment for schoolboys we will not give as a point in its favour, but be content with a reference to the circumstance. The Birch is not often seen in our own country of a very large size, but some years ago *The Nelson Daily Times* of New Zealand mentioned a Black Birch that was felled by a surveyor's party at Staley Creek, near Ahaura, which measured at the butt fifty-seven feet in circumference. A curious use for the Birch is found in Lapland, Norway, Poland, Russia, and Sweden, where the twigs are gathered in small bundles, dried with their leaves on, and used in vapour baths for beating bathers' backs to induce perspiration. Its imperviousness to moisture induces the use of thin strips of its bark between the soles of shoes, and, in hats, to keep out wet. For the same purpose it is put on the copings of walls and over the masonry of vaults to keep water from soaking down into them from the ground above. It is also placed around the bases of posts inserted into the ground to keep them from rotting, and is put to other uses of a similar kind on account of its imperviousness to water and dampness. To

freaks of nature the Birch is subject as much as other trees. The curious branches of small twigs, which look like birds' nests and grow out from some of the branches, is one peculiarity it has in common with some other trees. At the Ballynatone Glebe House, Glenmalure, in the county of Wicklow, a Birch is growing which has a branch that has grown into its trunk in such a manner that it looks like a large jug handle. Finally, as an indication of the large quantity which could be manufactured, if people were so disposed, of 'Birch wine,' let us add that the amount of sugary sap which the tree is capable of absorbing from the earth is so great, that a slender tree—the White Birch species, *Betula alba*—no more than thirty-nine feet high and seven inches in diameter at the ground, has been proved to draw up seven-eighths of a gallon every twenty-four hours!

Birds and Trees.

MANY Birds which do not touch trees for food but only resort to them joyfully and delightedly for shelter, or to disport themselves in their branches, are often driven during the stress

of a hard winter to feed upon buds. Amongst these are the insectivorous Birds, which, finding their prey destroyed by frosts, are compelled by hunger to get sustenance from the vegetable growths of the forest. Deciduous trees do not offer much chance of refreshment in this way, though some of these, which have prominent winter buds, do afford food to the feathered race ; and the raids made upon them are often seriously complained of by those who cultivate trees for profit. Amongst trees thus injured from the forester's point of view, are the Birch, the Elm, the Lime, the Plane, and the Scotch Fir or Pine. The feathered depredators pick out the insides—the juicy and tender parts—from the buds and strew the 'husks' on the ground. We say the Birds which do this are injurious from the forester's point of view. Yet have not the Birds their 'rights'? Why should mankind greedily exact *all* the useful and beautiful things in this world? Birds and insects have surely some claim to the products of the woods and fields. In all fairness this world is as much theirs, in proportion, as ours.

Birds as Planters.

MANY noble trees owe their existence in particular places to the planter Bird, which, like 'the joiner squirrel,' does good by stealth and quite unintentionally. Rooks have been seen carefully burying Fir cones, and acorns also. How wise and thoughtful a provision! the simple observer of nature might exclaim. But the Bird is merely following a natural instinct. He buries that he may find again, and then either forgets his hidden store or arrives too late to make it of use. The squirrel, and indeed all nut-loving or seed-loving animals and Birds, perform the same office unconsciously. They carry their stores to what they believe to be secure hiding-places, and then forget them, and the germs germinate and spring up. Nature has it, however, in view distinctly to turn bird and animal instincts to her wise purposes. She colours fruits and surrounds seeds with juicy, attractive pulp, that Birds and animals may distribute the enclosed germs. The pulp is partly for the protection of the seeds it encompasses ; but it is mainly a bait.

Bog Wood.

MOST curious is the effect upon wood of long immersion in a bog. It becomes hard, oftentimes black, but not with decay, and is of marvellous durability. In Ireland the manufacture of ornaments from Bog Timber is quite an active industry; and the presence of large quantities of wood in bogs is proof of the forestal character of a country which is now almost denuded of trees. The wood dug up from peat which marks the former existence of bog-land, or from the moister depths of actually existent bog, is mainly Alder, Birch, Hazel, Oak, Scotch Pine, and Yew; and it is particularly curious that whilst the Alder, Birch, and Hazel dug up are commonly so soft and pulpy as to be positively useless—unless, perhaps, when dug as fuel—the Oak, Pine, and Yew is of wonderful hardness, especially if properly seasoned by not being too rapidly exposed to the sun and wind. Of two kinds of Bog Oak, the one is as black and almost as hard as Ebony, owing probably to the presence of iron in the soil, and the other kind is brown in colour, retaining the natural hue of the wood as slightly modified by bog immersion. Some little time since a correspondent in Ireland, Mr. Archibald Henderson, kindly forwarded to us

three specimens, polished, of Bog Timber. They were all in an excellent state of preservation, and illustrated strikingly the beauty of this kind of wood. The largest and heaviest was a piece of Yew-tree wood, dug up in the Killenmore Bog, King's County, in June, 1883. No one could have suspected that this fresh-looking and beautifully grained piece of wood had ever been immersed in water. The second specimen was of Irish Oak from a tree taken from the bed of the Tullamore river, about a hundred years ago; and the third a specimen of Irish bog deal from a tree dug out of Gorteen Bog, King's County, nearly seventy years ago.

Bone Trees.

THOSE who have read of 'carnivorous plants' —a species of vegetable spiders that allure, entrap, kill, and 'assimilate' flies—will not be surprised, perhaps, to read of trees which collect bones. Some two or three years ago, Captain Maclear, Commander of her Majesty's surveying ship *Alert*, having read in one of the public papers

a reference to 'a curious tree that picked up bones,' set inquiry on foot by writing to Mr. Chester, the resident magistrate at Thursday Island, for information concerning this remarkable tree. The answer he received was as follows:—'I have made inquiries about the tree, and I find that it grows at Marbiac, not far from Pearson's station. It is a kind of Banyan, or Fig Tree, and sends down long vines or tendrils (roots) from its upper branches. These run along the ground, and twine round any small obstacles in their path, such as bones and other unconsidered trifles. The vines afterwards contract, and draw up whatever is attached to them. This is Pearson's explanation of the phenomenon.'

Buckland Drives.

PERHAPS in the whole county of Devon, and in few other places, there is no district which presents, in the same compass, a greater variety of scenery than that included in what are known as the Buckland Drives. Approaching from Ashburton, about a mile from the town, you enter an

avenue of trees, an opening in which, on the left-hand side of the way, affords a peep of undulating hills, wood, meadow, and cornfield, and, in the hollow below, the Dart gleams out, as it courses through the valley, from embowering woods. Away in the far distance, closing the view and rising above the highest of the surrounding hills, is the densely wooded crest of Brent Tor. Emerging from the avenue, we take an upland path to the right on to higher ground, from which a wider and grander view of delightful country is obtained. Away below, as we look towards the south-west, lies the beautiful valley of the Dart, over the wide extent of which are green meadows, with trees here and there casting, under the sunshine, their chequered shadows on the ground, whilst dark green coppices are also spread along the depths of the valley. Towards the horizon stretch undulating hills, and away to our right is the fringe of Dartmoor, with its hills of blossoming heather. A few steps further on we enter a path fringed on each side with gorse and heather in full bloom. A gap on the left opens up a glorious peep of the wood-embowered Dart. Then we pass under the shadows of a Fir copse on our left, and on our other side we have a furzy, heathery slope. These Firs overshadow the path on both sides of our way, but on our left we get a peep, between them, of the

scene below in the valley, from which the roar of the Dart rises but faintly to the spot on which we are standing. Our path is now fringed with brakes under the shelter of a plantation of Oak and Beech trees, through which the wind musically sighs. Here, on both sides, there is delightful landscape. On our right is a slope scattered with Firs, and underneath purple heather and golden gorse strikingly contrasted by fragments of grey rock shining between them. On the other side, down below, lies Holne Chase, and beyond it woods and meadows. Presently our path is cast into shade as it passes under a copse. Above and below us trees spread upwards on the sloping hill-side, which is covered with an undergrowth of brake, through the green fronds of which grey rocky masses peep. Then we begin to descend once more, and presently our path emerges on to the open hillside, which above and below discovers rocky projections amongst the brake and heather. Stepping aside for a moment from our path we obtain, free from the obstruction of the trees which fringe it, a delightful view of the scenery below. Away in the depth of the valley rolls the Dart, above which, on its opposite side, extends the dense woods of Holne Chase. From our path down to the river's brink stretches a rocky, heather-covered slope. The Dart, from its embosomment of woods

on our right, comes out and brawls along in zigzag fashion until it is lost from view below us, where the hillsides meet. To the north-east the barren summit of Buckland Beacon rises from the midst of its lovely surroundings. Beyond and above Holne Chase are sloping hillside, wood, and meadow, the green bottom of the valley taking the shadows cast by fleecy clouds, whilst the whole of the soft landscape is contrasted by sombre patches on the rolling heights of Dartmoor. For some distance our path winds through a copse, whilst on the steeps below and above us the ground beneath the trees is gracefully clothed with bracken—the roar of the rushing river reaching us through the trees, through which also the sunshine glints. Then we cross an open expanse, whilst lovely scenery lies below us on our left. Presently we pass through another copse, and come out upon a road, and, turning to the left, pass through the village of Buckland. Beyond the village we again mount a winding wood-path, turning and ascending until we reach the commencement of Buckland Drives, getting peeps from time to time on our way of the most beautiful scenery. Through the Drives for a mile we proceed along a most delightful road. On our right and on our left a hill rises and falls, densely covered with a beautiful drapery of green, whilst the subdued roar of the Dart below is heard

along nearly the whole of the way. Now we get, on our left, a peep of a vast sea of green as the trees on our hillside appear to blend with the trees on the opposite height—the branches opening out and giving a prospect of wooded hill and verdant meadow, down, away, and beyond. Now, steeply shelving from our path, the wood goes over broken ground gracefully tapestried with fern, ivy, and many a creeping plant. Then our way winds down into the valley, and, turning and winding still, keeps along its bottom for some distance. A stream runs by us on our right, and hills rise above us on the other side. Then our path winds upwards, and —as we again leave the river, which roars along below—is covered by screening branches as we climb a hillside densely clothed with ferns—moss growing upon and peeping out from between boulders, and made green and beautiful by the streams which trickle down the declivity. Higher and higher we rise, until at length a scene of surpassing loveliness bursts upon us. Away below in the depth of a gorge the river Webber, unseen, roars along. The sides of the gorge form an amphitheatre of hills, whose bases intertwine, their sides densely clothed with woods. Far away in the distance the landscape is made up of undulating, meadow-covered hills. A few steps further on, a seat, temptingly placed two or three feet from our

path, invites us to pause. Away below us in the depth of the gorge we can see the course of the river where it shines in the sun for a distance of a few yards. A screen of trees partly hides the right-hand view. From this point the river Webber is seen as it winds along the valley on the right, getting nearer and nearer to the waters of the Dart. Holne Chase spreads across on the opposite banks, over which hang jutting rocks. The Dart winds also round from the right and rolls away to the left on the other side of a promontory of rocks. Here the scene of river and wood presents a climax of wondrous beauty, for, standing high above the top of an Oak Tree growing on a projection from the precipitous bank below us, we look far down through its branches upon waters foaming and roaring in the narrow green depths of the ravine, dashing on huge mossy boulders, whirling into a thousand picturesque eddies—giving, as it were, the charm of voice to the landscape, and the quick pulse of motion to the green life of nature.

'Buildings of God.'

IT was a pretty fancy which suggested for trees the expression which heads these remarks. How very beautiful these 'Buildings' are is never more strikingly shown, perhaps, than during the season of summer. So, at least, is the impression of the present writer; for the verdancy of foliage during the leafy month of June is usually remarkable for its freshness and loveliness. An American writer said, some time ago, 'I have seen in an hour's drive in various parts of England more numerous and finer trees (excepting the American Elm alone) than I have seen in all New England.' If not always for their *size*, the trees of England for their especial and peculiar *beauty* are certainly unrivalled. To ruthlessly and thoughtlessly cut them down, as is sometimes done—though the practice is, happily, much less frequent than it used to be—is an offence against that taste which is amongst the most elevating of the refinements of modern civilization. The promotion of arboriculture in places where, as objects of beauty and sources of healthfulness, trees conduce to the happiness of mankind, is a duty to society which every man should endeavour to perform. Why should we not have fewer of man's buildings and more of 'the Buildings of God'? We must necessarily

have much recourse to the useful art of the builder; but we carry the rage for building too far. Why need we make nearly all our monuments of stone or marble? And why can we not have 'trees for monuments'? This idea is a delightful and suggestive one. Oliver Wendell Holmes, in commenting upon it, says, 'I hope that the example set of planting trees as monuments will do as much for American landscape as the best of our authorship has done for American literature.' He adds, 'The trees may outlive the memory of more than one of those in whose honour they were planted. But if it is something to make two blades of grass grow where one was growing, it is much more to have been the occasion of the planting of an Oak which shall defy twenty score of winters, or of an Elm which shall canopy with its green cloud of foliage half as many generations of mortal immortalities. I have written many verses, but the poems I have produced are the trees I planted on the hillside which overlooked the broad meadows, scolloped and rounded at their edges by loops of the sinuous Housatonic. Nature finds rhymes for them in the recurring measures of the seasons; winter strips them of their ornaments and gives them, as it were, in prose translation; and summer re-clothes them in all the splendid phrases of their leafy language.' A step in this direction has been taken in England

by the beautification of old graveyards. The monuments erected by sorrowing friends are, at the best, but temporary. Time and change soon obliterate and remove them; and then, in the ordinary course of things, ugly buildings are crowded in to supply unwholesome space for the overpopulated denizens of great and growing towns. Is it not far better that the monuments in these old resting-places of the dead should be replaced by trees, and, in truth, made ever beautiful? Why, indeed, on each fresh grave, may not a tree be planted in lieu of the lugubrious slab of stone? Surely it would be a happy idea for those who mourn the dead to fancy that the beautiful unfolding of the tree was merely the life in another form of the body that had been laid in the earth—to fancy that whilst the spirit had fled to where God is, the framework of mortality with which we associate the melancholy ideas of 'corruption' had assumed a new shape, not of death, but of vitality. We know, *in fact*, that the beautiful forms of trees do grow from the substances which, but for this wise provision, would work destruction by pestilential air. Why then do we not assist the forces of nature, and promote cheerfulness, healthfulness, and beauty, instead of gloom, disease, and ugliness, by putting over our burying-places, not the lugubrious monuments of man, but 'the Buildings of God'?

Cedar.

THE question, which has frequently been asked, whether the Cedars of Lebanon which were living in the time of Solomon, and were referred to by that wise potentate, are still existing, is one that will probably never be satisfactorily answered, though the discussion of it is always interesting. Considering the longevity of trees and the fact that the Cedar is very long lived, it is by no means unlikely that some of the far-famed trees of Solomon's time still exist on Mount Lebanon. Many travellers have affirmed their belief that the old trees have lingered on into our times, and some of them have gone so far as to indicate the number (amongst existing trees on Mount Lebanon) of the sylvan patriarchs still living. Amongst those who have mentioned the trees, averring they had seen and counted them, the following are given from names published :—Belloni counted twenty-eight in 1515 ; Rawloff saw twenty-four in 1575 ; Dandini saw twenty-three in 1600; Maundrell counted fifteen growing and one blown down in 1696 ; Peacocke saw sixteen in 1738 ; Burckhardt saw eleven in 1810 ; Richardson saw seven in 1818. Lamartine, from a personal visit in 1833, averred that there were only seven that, from their massiveness, could

be pronounced contemporaries of the Biblical era. Mr. Kinglake, later still, discredited the prevailing notion that the trees he saw 'were standing at the time when the Temple of Solomon was built,' and said he saw nothing in their appearance to prove this. But Eliot Warburton, in 'The Crescent and the Cross,' published in 1845, maintained that, at the time of his visit to the region, there were twelve of the old trees remaining. 'There are twelve old trees, or saints as they are called,' he says; 'yes, twelve, I will maintain it, notwithstanding all the different computations on the subject, are there standing now, and the largest of these is forty-five feet in circumference; the second is forty-four. Many of them are scarred with travellers' names.' We strongly incline to the belief, because it is a possibility that admits of no wonder considering the marvellous endurance of the Cedar, that the largest and oldest of the trees on Mount Lebanon were the contemporaries of those cut down by Solomon for the Temple. A large, venerable, and finely grown Cedar is rather an awe-inspiring tree, and, when young, is a very beautiful and graceful object. Especially is this true of the Indian Cedar (*Cedrus deodara*), which in some Eastern countries is worshipped. With its branches, in its younger stage, feathering to the ground, *Cedrus deodara* ('the sacred Indian Fir') is particularly graceful and beautiful.

Cherry.

FAMILIAR enough is the form of the garden Cherry, the numerous varieties of whose fruit are as attractive in colour as they are well known. But it is of the Cherry of the woods—the wild species, *Prunus avium*—that we would speak here. Frequently seen, it is, when in blossom, a prominent and beautiful object, but its size as commonly found is not ordinarily very great. The measurements, however, of one growing in Dorsetshire are exceptionally remarkable. Even at ten feet from the ground it girthed nineteen feet, whilst at two feet, and also at six feet from the ground, its girth was seven yards—a diameter of seven feet! Its trunk reached a height of twelve feet before forking.

Chromophyll.

GREENNESS, as we know, is produced by the presence of a substance called chlorophyll in the superficial cells of all vegetation that is green. It is not really the actual surface of a leaf that is

green, for the surface is a thin cuticle of cellular tissue, and is nearly colourless. But this cuticle is transparent, and enables us to see under it the massed cells containing the green colouring matter which gives to plants their most familiar hue. There are, however, as we also well know, many other colours in plants besides green; and these are produced by the presence in the superficial cells of the plants that exhibit them, of a colouring matter analogous to chlorophyll. To describe generically all such colouring matters, including those of flowers and fruit, the designation —a very appropriate one—of Chromophyll has been suggested. Why in the surface cells of some leaves and flowers there should be one set of colouring matters, and in another set another, is a mystery which is amongst the most interesting of the mysteries of plant life; and the mystery is deepened by unexplainable circumstances, such as the appearance on a bush of scarlet Hawthorn of a spray of pure white blossom. The appearance indicated may be reversed, but is always curious and inexplicable.

Cones.

IT is a beautiful provision by which Nature encloses the seeds of the Pines in the hard woody receptacles called Cones. The apparent reason for the existence of this especial covering is the necessity of protection for Pine seeds from the injury they might sustain in falling from the trees, which ordinarily grow in high and exposed regions, on to the rocky or rough ground below. Enclosed in their stout protective cases they descend harmless to the earth. The Cones, too, provide a means of distribution; for, in falling, they doubtless often rebound and roll away from the spot where the parent trees are growing, and, breaking, cast their contents about them. The production of Cones is subject to the strange irregularity which marks the production of flowers and fruit in general—in some years being very abundant and in others very scarce. In the Cone years great beauty is added to the Pines by the clustered presence of their handsome fruit.

Cork Tree.

OFTENTIMES when trees provide men with what is useful or beautiful they do so at their own expense. The death of the tree is essential to the possession of its valuable properties, and something is consequently sacrificed for the present gain. Yet some trees not only yield their produce without injury to themselves in any way, but they actually benefit by what they give away. Such is the case with the Cork Tree, which, it is not perhaps universally known, is an Oak—*Quercus suber*. Relieving it of its outer bark, which constitutes the familiar Cork of commerce, adds to its period of existence. With its bark always left on, the tree, it is said, could not live more than fifty or sixty years; without it, 150 years may be the term of its life. We know that the Plane periodically sheds its outer bark, and grows freely, and indeed rapidly, by the process. But man mostly relieves the Cork Tree of its useful environment, and similarly the process is beneficial. The Cork Tree in appearance is much like, especially in the form and colour of its evergreen leaves, the common ilex (*Quercus ilex*). On the continent of Europe it is a native of France, Portugal, and Spain, and it grows abundantly in the forests of Algeria, as well

as in the islands of Corsica and Sardinia. The especial increase of the Cork of this tree begins when it is about five years old, and the outer bark grows large, spongy, and thick. It does not do to leave it on the tree, for it would crack, become deeply fissured, and hence be unfit for use. To separate it from the tree great care has to be taken not to cut the inner bark. The cuts are made in the directions of the circumference and the length of the tree, *i.e.* across and down the trunk. The surface is gently beaten to separate the outer bark, and an instrument is used made for the express purpose, and having a curved thin edge to insert under the bark, which, by its aid, is detached in cylinders, but cut, in places, as we have explained, to admit of its coming off easily. July and August are the months when the operation is performed, and it can be repeated every eight or ten years. The crop of Cork is gathered into stacks, after being pressed flat with weights, and charred a little on the surface to close the pores of the bark. The process of drying takes two or three months—about one-fifth of its weight is lost by drying—and then it is ready for all the purposes essentially useful, and indeed ornamental too, to which Cork is put.

Destruction of American Forests.

THE subject of the alarming destruction of American Forests is not a new one. It has been discussed, from time to time, in the English and American Press; its urgent importance has led to the establishment of an American Forestry Association; and it has been warmly and urgently discussed at two special Forestry Congresses which, resulting from the formation of that association, met at Cincinnati in April, 1882, and at Montreal in the August following. Notwithstanding, however, the immense, the vital, the overwhelming importance of this subject, not only to the people of the great American continent, but to England and to other countries—for we venture to assert that it is a subject of cosmopolitan interest—the fact remains that no practical measures have yet been adopted to stay a ruthless process which, if not immediately checked, will bring ruinous disaster upon some of the fairest portions of the world's surface, and, within a measurable period of time, inflict evil, the extent of which it is impossible to forecast, upon some of the noblest sections of the English-speaking race. Regarding the subject from an English standpoint alone, we might say that the danger and the evil are less in degree to

us—though serious enough—than to our Canadian Dependency and to our American relatives. Yet so intimate and important are the relations between the two peoples, that a check in the prosperity of America means commercial stagnation of no inconsiderable a kind even to us. But a warmer and more generous feeling than that with which our nation is generally credited flows in the hearts of English people for the great Transatlantic populations born in Old England. We admire their energy and enterprise—qualities inherited from the land of their birth—their marvellous ingenuity, their undaunted 'pluck,' their magnificent industries, their unbounded resource, their great and growing intellectual power. We are proud to have produced so splendid a race; and if we see, with somewhat cooler heads, dangers which the rapid progress of Americans gives them no time to estimate, we are, in duty, bound to help, in what way we can, to reiterate on this side of the Atlantic, for their sakes more than for our own, the cry of warning that has already been raised and repeated by the more thoughtful of the citizens of America. Mr. William Little has done more, perhaps, than any other man in the United States or Canada—except his father, the late Mr. James Little, who first raised an outcry against the ruthless denudation of North American Forests—to

call attention to a subject of the first economic importance. 'Probably no name in the country,' said an American journal so long ago as June, 1882, 'is more familiar to those who are at all conversant with or interested in the subject of forestry than is that of James Little, of Montreal, who has made the timber resources of this country almost a life study. For years his fluent pen has been sending forth constant warning against the wanton and unnecessary destruction of the timber resources of the country. As a timber statistician he probably stands to-day without a peer. At the opening of his crusade against the "wood-butchering," which his sound judgment and discernment discovered was becoming alarmingly prevalent, his cautionary signals, sown broadcast, were viewed as wildly fallacious, and were looked upon by many who had imbibed the impression that the timber supply was inexhaustible, as the effusions of a crank whose idiosyncrasies had made him a monomaniac on the subject. But the future revealed the fact that his judgment was far in advance of public sentiment, and we are now brought face to face with the fact that the progressive steps of this same public sentiment have just at present advanced sufficiently to obtain faint glimpses in the book which has been continually open to his more advanced and mature judgment, and he is recognized to-day as an

acknowledged leader in a movement which is destined to become one of the most important to the country's interests. In the report of the proceedings of the Cincinnati Forestry Convention as published in the *Enquirer*,' continued our American contemporary, 'a graceful allusion was made to Mr. Little, who, being prevented by his venerable age from being present, sent a very valuable paper on the "Pine Forests of Canada," which was read by his son, William Little. Mr. Little referred to the serious commercial effects that must arise from a total loss of woodlands, and, having laboured for years almost single-handed to bring his own people to a proper knowledge of the subject, he expressed gratification that the papers of this country had so generally taken up the question of forestry. He claimed that the Black Walnut, once so abundant, and Oak, Ash, and Elm, for long a great source of revenue to the country, were nearly all gone; while Pine, Spruce, Birch, and Tamarac were following so fast that soon none would be left of commercial value. He corrected the error of considering the timber land of Canada as practically exhaustless. He thought ten thousand millions of feet, board measure, would comprise the merchantable Pine of Quebec, Ontario, New Brunswick, and Nova Scotia, which might be exhausted in less than ten years. There

was, no doubt, considerable White Pine in Newfoundland; but the reports of White Pine in the vicinity of the Hudson's Bay were probably occasioned by miscalling the White Spruce White Pine, as is done in some of the markets of England. The only Pine of any extent found there is an inferior timber tree seldom large enough for saw logs, called the Banksian Pine. He quoted the remark of Charles Gibb, that "our native White Pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become." Britain, which was supposed to need timber only for repairs, being built up, paid seventy-five to one hundred million dollars yearly for her timber, paying the cheapest rates. Mr. Little thought that if the waste of forests was not checked, it would cost more than all the exports of grain and cotton, and require more than the combined sailing tonnage of the whole world, to procure timber for the United States from other countries. The effect of the dearth of timber now threatened upon the industries of the United States and Canada was one which might well cause apprehension.' It is only an act of justice to Mr. William Little to record the earnest and persistent efforts which he has made, in support and in continuation of those of his late father, to arouse a lethargic public to a sense of the great danger which threatens them. His services in this

direction were prominently recognized by a special resolution passed at the meeting in Montreal of the American Forestry Congress, of which he was vice-president, in August, 1882. Two years have gone by since that Forestry Congress met at Montreal, and we are still face to face with the fact that nothing has yet been done to stop the course of an evil which will inevitably and speedily entail the most disastrous results—for what otherwise could ensue if the American White Pine forests are doomed, at the present rate of cutting, to disappear in seven years? It is evidently, therefore, high time for interference by the American and Canadian Governments. The question which will of course naturally arise in the reader's mind is, What is the remedy for this acknowledged and indisputable state of things? The reply to that question is twofold. First of all, the wanton and reckless, the outrageously and unnecessarily destructive methods of tree-cutting in the United States and Canada must be peremptorily stopped by legislative interference. A wider and more economical method of lumber production, such as would result from this suggested intervention, will avail, if immediately applied, to arrest the progress of the evil. But such a course could only delay—it would not prevent—the ultimate denudation of the forestal districts of America and Canada. Side by side,

therefore, with the measures designed to correct the reckless proceedings of the lumbermen there must be replanting of the denuded areas. If there be a difference between the urgency of the one and that of the other the greater urgency is for stopping the progress of the destroyers.

Devonshire Lanes in June.

IT is our privilege to enjoy almost the first day of a real summer amidst the delicious greenery of some Devonshire Lanes. There have been many fine days of late, and there has been plenty of sunshine; but the cold, unseasonable air has thrown an almost icy chill over the early part of this leafy month, and the foliage exposed to the half-frosty night winds gives witness, by its shrivelled and almost blackened appearance, to the sensitiveness of its delicate tissues to the ungenial influence. Yet here, upon the steep sides of Lanes half hidden by embowering trees, shelter from the withering blasts which work their worst upon open heights or unprotected plains, has kept all

growing things in a state of delightful freshness; and now that the luxurious softness of the most genial summer weather tempts one, in summer costume, to wander out and away without fear of drenching rain or sudden hailstorm, the sensation experienced by plunging into the depths of Devonshire Lanes is one of intense enjoyment. But it is as often a climb as a plunge; for not alone in the valleys, but along the sides and up on the tops of Devonshire hills do the characteristic Lanes of the beautiful country run. We have just climbed a little way up one of these delightful green avenues —for veritable avenues they are, their own high embankments overtopped, on either side, by tall Elms or Oaks, and densely clothed by the freshest of delicious greenery, set off by a marvellous abundance of wild flowers—golden, red, white, and blue. Pausing a moment at the point we have reached, where the Lane, widening for a moment, admits a flood of sunshine into its recesses, we fling ourselves on a soft grassy bed that margins the Lane-side, and look out and away down into the valley below at the white-walled, slate-roofed houses of the little town where for the moment we have taken up our quarters. It is an exquisite peep. In the depths of the valley, upon the lower, sloping sides of which the cosy dwellings nestle, flow the waters of the most beautiful of Devonshire rivers.

The dark stream, winding amongst the woody recesses of the valley and flashing in the sun, is seen only for a brief space, for it is immediately lost, as its course continues, between the wooded sides of interlacing hills. It is too far to hear the sound of its waters, but there comes up from the valley the sweet music of rustling leaves—music which swells into louder strains as the Æolian minstrel touches the embowering trees above the spot on which we are reclining. One looks up instinctively as each musical wave passes overhead, noting that the beauty of the sky is perfect, for the exquisite delicacy of the blue is thrown into just the necessary relief by the light masses of pure white cloud that float under the eye of the sun. Then down over the hedges and meadows that lie on the slopes below in the green depths of the valley, and beyond, from its lowest point over the half-pastoral, half-wooded uplands that reach away until bounded by the purple lines of distant moorland, there is a stretch of country which gives a glimpse of rural panorama rarely seen even amongst the best landscapes of these beautiful islands. But one need not look so far afield for beauty. The hedgebanks are revelling in loveliness. Just here, perhaps, the most striking feature of colour is furnished by those delightful and familiar wild flowers, the red robins. The brilliant

vividness of their hue is indeed wonderful. They must be seen at this season to be thoroughly appreciated, and in the size and splendour as well as in the abundance of their blossoms they far outvie the decadent dusty 'robins' of the later summer. Next in profusion to *Lychnis diurna* is the cranesbill, of which several species crowd the hedgebanks—one of them, the round-leaved cranesbill, rare in many localities, being abundant here. The pretty pink blossoms, delicately veined with white, beautiful and plentiful as they are, seem almost obliterated by the gorgeous colour of the leaves, which already, in places, have dyed the hedgebanks with a blood-red hue. Where the banks lie aslant and open to the sun-rays, there are crowded the deliciously blue flowers of the speedwell, and often, in company with them, but in moister and more shaded spots, sweet little blossoms that seem to reflect, as if in tiny mirrors, the speedwell colour—we mean the forget-me-nots, which, growing high in the hedgebanks, appear out of place, yet attest, by the unusual smallness of their flowers, that they are not in the marshy nooks which they best love. Buttercups have strayed here from the meadows, and uplift their blossoms to the sun, but are outvied in largeness and in the splendour of golden bloom by the beautiful, star-like flowers of the hawkbit. But the most impos-

ing figures on the sunlit hedgesides are the gorgeous flower-spikes of the foxglove, now in the height of their June glory. Rising mostly from the hedge-tops with stately grace high above the tangle of Ivy, Hawthorn, Briar, and Bramble, they are the crowning floral beauty of the Lane. The goose-grass, in places, makes a dense mass of vivid green, but its flowers are not out yet, though, through the tangle of its greenery, peep the pretty white blossoms of the smaller stitchwort, making believe by their own inconspicuous stems that they belong to the larger plant. The true spring flowers have mostly gone from the tangle of these hedgebanks, but their green reminders remain—primrose leaves adding especially to the wealth of verdancy that so densely clothes the slate-rock and red sandstone earth of the banks on either hand. Yet, on peering in amongst the green tangle, we descry just one lingering stalk of wild hyacinth bloom, which, though its scent has gone, retains the depth of its dark-blue beauty. Before leaving the sides of the open sunny hedgebanks, we must not forget the beautiful leaves and blossoms and the green and ruddy fruit of the wild strawberry. It is early yet for the fruition, but we gather some berries of delicious flavour. A pretty little picture the small plant makes when, on the same stock, the bright green, trifoliate, indented leaves are contrasted

by the white five-petalled corollas, with their golden centres, and by the reddening and ruddy berries. In the sun the delicate hairs of the leaf stems sparkle and scintillate, and the pale green under sides—as the wind moves the leaves—show against the deeper verdancy of their glossy upper surfaces. We have been wandering on from our first resting-place from Lane to Lane, passing alternately through shadows of overarching boughs and sprays, under the tangles of Hazel, Briar, Bramble, Hawthorn, and Sloe, across spots open to the full influence of the sunshine, and alternately ascending and descending through delightful mazes of greenery, and by wild pastures crowded with summer blossoms. We have not forgotten the ferns, which form so prominent and conspicuous a feature of all Devonshire Lanes—brake and hart's-tongue, male fern and lady fern, the beautiful and richly coloured shield ferns, and the modest polypody. These are everywhere, growing boldly in the sunlight, where their roots are snugly ensconced in the cosy shelter of slate-rock or tree stump, but looking most beautiful in those shady nooks which they chiefly love. But space forbids. We have only noted what is most prominently noticeable; and if our brief and hurried description should tempt a few of our readers to explore these delightful lanes in the glory of the young summer, our object will have been obtained.

Dip into Forest.

ONE wayside peep of Forest was so irresistibly enticing that we called a halt for a brief space, and bade the coachman await our return. Climbing the low, daisy-covered mound that separated the roadway from the outer fringe of wild Forest, and leaping across a little stream of water that ran along its inner side, we alighted on a mossy bed of turf of such elastic softness as to give, by contrast with the hard streets so lately trod, a thrill of pleasure. At the same moment there came an exquisite scent of wild Briar that seemed to be wafted from a dense tangle of underwood through which could barely be seen the small expanse of a sunlit glade beyond. We tried, but in vain—who has not fruitlessly tried a hundred times before ?—to trace the source of the Briar perfume. Creeping through the thinnest part of the tangle, we emerged into the glade. Here the ground was literally gold and white by the crowded presence of buttercups and daisies, whilst the wild shrubbery around, lit up by the brilliance of the 'May,' filled the air with a new fragrance. Though not a hundred yards from the roadway we had just left, it was veritable fairyland: no human being in sight, no sound of voices; but the delicious

and indescribable stillness of the Forest gently broken by the hum of insect wings and the warbling of birds. The music, the stimulus of sunshine, the perfumed air, the wealth of colour, made mere existence, under their influence, an inexpressible pleasure. Irresistibly drawn farther into the greenwood, the scene was materially changed. A spreading network of Oak branches, with foliage of that deliciously golden green which marks the early spring of this tree, shut out the rays of the sun, but made a fitting canopy for the delightfully green carpet of grass, blue-woven with wild hyacinths and studded over with mingled clumps of Briar, Bramble, Hawthorn, and Hornbeam, through which rose the beautiful star-like, snow-white blossoms of the stitchwort. There opened up beyond the prospect of a glade spread with Gorse, gorgeous in its splendour of golden bloom, and then a tangle whose recesses the eye could not penetrate. But time pressed, and we had to retrace our steps and regain the high-road. Yet who that can spare if but a few hours from the arid streets of a great city will not visit scenes so refreshingly grateful to weary brain-workers and toilworn men and women ?

Douglas Fir.

MANY trees are recommended for their healthfulness, and are planted near dwellings in gardens and parks and selected for street-planting on account of their desirable sanitary properties. But though coniferous trees are known to many persons to be especially health-giving, the popular acquaintance with their particular properties is not very widespread. There is one species, however, of the cone-bearing tribe less known and appreciated than many others, but with sanitary and other pleasant properties which perhaps may be said to rival them all. This is the Douglas Fir (*Abies douglasii*), a species of Spruce. A handsome tree, whose light tassels of spring-green contrast charmingly with the more sombre hues of its winter evergreen dress; a vigorous and rapid grower in almost any soil; a disperser of sweet resinous odours which are grateful to the senses as they are healthful to the lungs—this tree should no longer be ignored. It is so cheap that its price at a nursery would astonish the unprofessional purchasers of plants, and we trust that, if not before cultivated in gardens near houses and in the streets of big towns, those who read this item of gossip will lose no time in making close acquaintance with the Douglas Fir.

Eaglewood.

A CURIOUS name is that of 'Eaglewood' for a sweet-smelling, resinous product found in the heart of trees in the Burmese forests, and in the islands of the Mergui Archipelago. The Burmese call it Akyaw, and the Malays Kayugaru. It occurs in hardened masses or lumps in the interiors of half-decayed trees. It is mixed with partly decayed wood, and the tissues of the wood are infiltrated with the resin. Though it is found throughout the trunk of the tree it is mostly discovered in the alburnum or sap-wood, but only in such parts of the wood as have been caused to decay by injury, either intentional or accidental. It has been suggested that the supply might be increased by intentionally injuring growing trees. It is used for incense, for medicine, and for torches, and so great is the demand that eight thousand trees are annually cut down to supply it in the islands of the Mergui Archipelago. The resin is said to be produced by *Aquilaria agallochum*.

Early Summer.

FEW periods of the year are so delightful as the delicious season that extends from the later days of May to the beginning of June; and no more typical illustration of this beautiful time could be afforded than by the day on which these lines are being penned. The sparse, white, fleecy, buoyant clouds, in an otherwise spotless sky, do not dim the splendour of the glorious May sunshine. A breeze, soft and warm, yet fresh enough to be exhilarating, communicates that gentle movement to twig and leaf which gives so much life to scenery. We write in a country of hill and valley, of upland and hollow, of orchard and fruit garden. It is a pastoral and agricultural district; yet its meadows and fields lie at the feet of steep hills, upon whose green sides cultivation is struggling with the wildness of nature. Corn and green crops, grass field and orchard, are mingled with spaces of heather and broom—the glow of red sandstone and the stern grey of granite contrasting, as these rocks peep out from amidst their delightful surroundings. The orchards are gloriously enveloped in mantles of blossom — the masses of bloom, delightful forerunners of abundant fruit, oftentimes obliterating the twigs upon which they are borne

The meadows are golden with crowding buttercups whose brilliant depth of hue is gracefully set off by their daisy companions, which grow in myriads between them. Primrose and hyacinth are still abundantly to be seen; but they have had their heyday of beauty, and the cowslip and cuckoo-flower are claiming, in their thousands, to succeed. Amongst the grass, in places, are thickly scattered the delicate and beautiful forms of the speedwells, whose delicious blue seems like a reflection of the sky. The air is filled with the fragrance of full-blown Hawthorn, and with the sounds of joyous birds. Nightingale and cuckoo, thrush and blackbird, are the choristers of this delightful season of song; but *every* feathered singer is warbling, though it may be in soft and gentle strains, his note of joy. In animated nature there are few things which touch the sense of beauty so strongly as the sight of the fragile but exquisitely lovely creatures we call butterflies. The eye may be reposing itself, perhaps, on some forest clump of greenery, noting the snowy white or the deep blue of blossoms which set off the uniformity of verdure; when, suddenly, whirling on its airy flight, a gorgeously apparelled butterfly dips, and resting for a moment on the clump, just long enough to bring its colours into delightful contrast with the more sober hues of plant and blossom, is gone as

swiftly as it came—making a sudden vision of beauty, and leaving the mind imbued with the exhaustless and infinite resources of creative power. Less brilliant and beautiful to the eye that delights in colour, but not less wonderful, are those members of the insect world which disport themselves in the night. Yet there is a strong suggestiveness of mystery and charm in the graceful and tender flitting, dimly seen, of the night moths from plant to plant in forest glade, hedge side, or meadow—a mystery and a charm that are insensibly increased when the soft light of the moon illumines their nocturnal wanderings, and the bubbling music of the nightingale floats out upon the air from adjacent thickets.

Embedded.

AN interesting list could be made of the numerous articles that have from time to time been found embedded in the trunks of trees—in their 'hearts,' as people say. Oftentimes explanation of the apparent phenomenon seems easy; at other times much mystery surrounds the

revelation. The discovery of toads *alive* in the hollow but hermetically sealed trunks of trees are amongst the strange and seemingly inexplicable facts. But often a stone is found embedded. On one occasion, a few years since, in 1881, when a large Ash Tree having being cut down in Belle Fontaine, Ohio, was being cut up for saw-logs, a well-preserved bone was found in the very 'heart' of the tree, some thirty feet from the ground. It was an old tree, and the bone, which was pronounced to be that of the human thigh, was believed to have been there 'for ages.' Many of these embedded articles have probably got into their strange position by the slow lapse of time. Accident has first, in all probability, caused the stone, or other thing discovered, to be lodged in the tree fork. Remaining there undisturbed, the tree has probably closed upon it, the wood growing over it gradually until it has finally disappeared. Initials and other marks found inside the wood of a tree have probably been first cut into the bark and wood outside, and, then, first the bark has closed over them, and finally new wood has been formed outside them until all has disappeared; but the impression remaining has left its indelible though externally invisible impress upon the woody tissue. Two or three years ago—the fact was first published and the circumstance was probably dis-

covered in 1881—a Pine cone of *Pinus sylvestris*, the Scotch Pine, perfectly sound, was found embedded in the heart of a Scotch Pine. It was in a cavity surrounded by resin, and quite inside the tree, so that it could not have been at any time put in or carried in by an animal or a bird; and it was believed to have lain embedded in the tree for not less than sixty or seventy years. This cone had probably at first fallen into a fork of the parent tree and been slowly taken into its substance. In 1882 some sawyers at Ardrossan, in Ayrshire, whilst cutting down a Wych Elm, came upon an embedded bird's nest containing six eggs. The wood had completely grown over it. The nest had probably been built in the fork of the tree, and it was estimated that it must have remained, until it was discovered, for not less than half a century.

Etching of Rootlets.

E W people would dream of sowing seeds on marble. Yet a curious effect was, it is said, produced by Sachs, the botanist. He sowed some

seeds on polished plates of marble, and the roots which were subsequently formed etched the hard surface. Here is the explanation. In the process of growth, roots give off carbonic acid, and this compound performs the office of a solvent on carbonate of lime. In marble there is carbonate of lime, and the carbonic acid of the roots, acting upon this, ate it away, and thus caused the root impression which performed the etching process.

Food.

NOT less necessary is it to the giant tree than to the tiniest blade of grass, that sustenance should be afforded to provide for the beauty of form and colour which we so much admire, and to promote, maintain, and increase its stability, vigour, and growth. *Life* of all kinds needs the continuance of that which makes it what it is. In gardens we are accustomed to feed the plants we grow, as we feed birds, animals, and fish kept in confinement, and in the purely *artificial* methods of gardening commonly adopted there must needs

be, for many plants, a renewal of the soil, as well as a provision for the existence around it of pure air and a supply of water—a renewal, that is to say, of such elements in the soil as are removed by the substances which the tree or plant, in growing, abstracts from it. This renewal is needed *because* of the artificiality of gardening methods. The race of 'gardeners' cannot endure the presence on the surface of the soil of fallen leaves, and it is the fallen leaves which in wild nature form the Food of the plants; for it is obvious that the very substances which make the leaves just what they are, being in them when they fall, must be carried back to the earth. Though storm and hurricane often prevail in the autumn, the time of the fall is mostly one of gentle calm, so that each tree can quietly drop its own particular leaves at its own feet, so to speak, or just where, when they have turned into the beautiful vegetable mould which they form, they can sink, by the action of rain, within reach of the rootlets below.

Forests.

IN the present day, Forests in populated countries serve two distinct purposes, both of which are useful, but useful in different ways. The one is strictly and severely utilitarian—using that word with its commonly accepted meaning: the other purpose is to provide the means of recreation and study; to furnish the large and rapidly augmenting populations of great towns with health resorts, whilst providing the opportunity, for those who seek it, of following the delightful pursuits of natural history. Even so recently as during the period embraced by the first half of the present century, the disposition of those who were responsible for the conduct of public affairs in England was to cut down woods everywhere, and to enclose and plough up the sites for agricultural, building, or other purposes. Large areas of open Forest land were thus sacrificed, and the Enclosure and other Commissioners appointed by various Acts of Parliament entered with astonishing vigour upon the, to them, apparently congenial work of destruction of magnificent and primæval woods. But with the commencement of the second half of this century a marked change in public feeling with regard to Forests took place, and it began to be realized that, unless some check were placed upon

the process of demolition, the consequences to the country would in every way be most serious, for the last remnants of the ancient woodlands would speedily disappear. Happily, however, some five and twenty years ago, public feeling in England against further reduction in their area began to set in very strongly, and Parliament, moved by the public voice, stayed the hand of destruction. The result is, that though ancient Forests have been sadly shorn of their pristine sylvan splendour, we have, at least, left to us some beautiful remnants which are well worth preservation. The feeling, or sentiment, which has thus led to the conservation of delightful woodlands has proved to be by no means ephemeral, but has, on the contrary been growing in intensity for many years past. It is natural that the growth of towns and the separation of town populations from the enjoyments of country life should produce longings for a reversion to the delightfulness of sylvan scenes; and it is a fact that at no previous period have our woodlands been so dearly prized as they are at the present time. If proof be needed of this allegation it is abundantly provided by the existence of the numerous natural history societies which exist in England, and by the immense development of the taste for natural history pursuits, including those of botany, entomology, and ornithology.

Fruit along Highways.

WHY might not Apples and Pears, Plums, Gooseberries, Raspberries, and other Fruit, be as plentiful along highways as Blackberries and Sloes? Few people are now so poor that they cannot afford to buy Fruit, at least occasionally. Yet it might be much more plentiful than it is, and there are wide areas that might be planted now lying bare. The juicy products of our orchards and gardens form such pleasant and wholesome food that their increase, in the manner suggested, would be a national blessing. Commons, roadsides, and railway embankments could be well utilized for Fruit growing. The idea is not a new one, but it has never been carried into practice to any extent in this country, or indeed anywhere. Some years ago, in Algeria, the railway companies entered with so much enterprise upon planting undertakings along the routes of their iron lines, that before very long they had planted as many as three million trees, a large number of them being Fruit trees. What an admirable example for other railway companies! For, apart from the utility and profit of such an undertaking, how pleasant railway journeys would be made by the abundant presence of spring blossoms, summer

leafiness, and the mellow charm of glossy-rinded autumnal Fruit. Out of the 14,000,000 Fruit Trees of all kinds which grow in Bohemia, 2,000,000 are planted on the sides of the public roads, between six and seven thousand miles of road being thus planted—with the best sorts of Fruit too—1,600,000 are on waste lands, and 10,000,000 in gardens.

Fuel.

NO part of a tree is wasted, but the ultimate fragments that remain after all that is most eminently useful to man has been obtained are turned to a good purpose. Bark, timber, leaves, flowers, and fruit all, in their several ways, minister to our necessities and give us shelter, food, and comfort; but when these have all been utilized, the disjecta, twigs and refuse, provide us with Fuel for our fires. This question of Fuel is an interesting one. In Sweden the Birch largely provides it, and in one year from one Swedish port as much as 25,488,678 cubic feet of birchwood has been

shipped to foreign markets for Fuel. But in another way wood is serviceable for Fuel, namely, in the form of charcoal—a product of burnt wood used to give intense heat, where, in certain arts and manufactures, such heat is needed. Charcoal is, in fact, a sort of concentrated essence of Fuel; and connected with the heating powers of the charcoal made from different kinds of wood, some interesting discoveries were made, a few years since, after repeated experiments. Two things were shown by these experiments: first, the time taken to make water boil by the same quantity of the ignited charcoal of different woods; and, second, the different periods of time the water was kept boiling by the same quantity of charcoal in the case of different woods. We shall give the results under the names, alphabetically arranged, of the various kinds of wood, in the order indicated, of (1) the time taken to make water reach the boiling point, and (2) the time the water was kept boiling: Ash, 16 and 40 minutes; Bay Laurel, 17 and 45; Beech, 14 and 31; Birch, 11 and 44; Box, 18 and 41; Cedar of Lebanon, 22 and 40; Elm, 13 and 33; Hazel, 15 and 46; Holly, 18 and 37; Hornbeam, 14 and 29; Laburnum, 27 and 40; Oak, 22 and 42; Privet, 14 and 50; Spanish Chestnut, 16 and 41; Sycamore, 13 and 37; Thorn, 15 and 46; Wych Elm, 20 and 28; and Yew, 20 and 38 minutes. Of course,

the water used was, as well as the charcoal, the same in quantity in each case. The quantity of charcoal was a quarter of a pound, and of water a pint.

Fungus.

HOW curiously life and death are mingled in the vegetable world is shown very strikingly by the growth of Fungus upon trees. Trees themselves thrive luxuriantly upon the 'humus,' or decayed vegetable substance—whether their own or that of other plants—which lies around or beneath them; and Fungus is as much a vegetable growth as the noblest tree, and, like the noble tree, thrives upon decay. What are called blights, mildews, rust, and smut are vegetable growths, generated apparently by certain atmospheric conditions, and propagated when their germs are existent by the same conditions; and not only do these small growths thrive on decay, but they promote it, so that starting from the roots of a tree they will extend to its trunk, and even run up into the branches, and slowly and surely, though

sometimes rapidly, accomplish its destruction. Oftentimes the Fungus will fasten, so to speak, on the leaves when young and fresh, and will only live when they continue so, disappearing and dying when they fall and decay. An instance of this kind of Fungus is that of the apparent 'black spots' on Maple leaves; the 'spots' being, as is seen on close examination, in reality the Fungus called *Xyloma acerinum.* It is an annual growth.

Golden 'Sports.'

SCIENCE is repeatedly baffled in its endeavours to explain, upon the principles it lays down, certain abnormal appearances. Nature especially is constantly refusing to subject herself to the 'laws' which man makes for her. How curious and interesting such 'rebellions' against 'law' are may be gathered from the following instance. The very name of 'Sport,' applied, in nature, to a departure from the normal form or customary habit of growth, seems to indicate a species of laughing contempt of Dame Nature, and of the rules

laid down for her. Here is one instance. When limbs or boughs are lopped from a tree and replaced, as is usual, by new branches, these are almost invariably produced upon the same plan and of the same colour as those cut away. Yet in the grounds of New College, Oxford, there is, or there was a few years ago, an avenue of Horse Chestnuts, a number of which had been deprived of some of their lower limbs, and had produced in their place numerous small shoots. Most of these were, of course, of the normal appearance and colour; but the shoots that proceeded from the neighbourhood of the lopped branch of one tree bore pale yellow instead of deep green leaves, and this curious phenomenon was continued throughout each season, and from year to year the same coloured leaves were produced. There was no apparent reason for this peculiarity. Chlorophyll, the pigment which gives their green colour to leaves, was deprived of its blue element, in one small part of the tree, for some wholly unexplainable reason.

Growth.

HOW various and curious are the rates of Growth! And what mysterious principle is it, existing in a plant, which causes the difference between it and another growing in the same soil and under the same natural conditions? Somewhat similar differences are observable in all growing things in earth, air, and water—in mankind, in animals, birds, fish, and insects; but they are not so numerous or remarkable as those observable amongst plants. As instances of exceptionally rapid Growth may be more interesting, perhaps, to most persons than any mention of ordinary rates of increase, a few of the former will be given here. The Blue Gum of Tasmania, *Eucalyptus globulus*, has been known to grow, in three or four years from the planting of the seed, to a height of thirty-five and even forty feet, the plants having diameters of from five to nine inches at two feet from the ground. In two years others have been known to reach heights varying from twelve to twenty-five feet, with a diameter of stem of from two to four inches. In 1878 a specimen was exhibited in the United States which had attained a height, in eleven years, of sixty feet, and had a diameter at five feet from the ground of thirteen and a half inches. So much

attention had the rapid Growth of this tree attracted in America, that in the ten years preceding 1882 six millions had been planted mainly in the streets and around the dwellings of American villages and cities. Even the giant trees of California, the Wellingtonias or Sequoias, are outdone in height by the Blue Gums, which, in the forests of Australia, rise sometimes three hundred, four hundred, and even five hundred feet from the ground. Their girth does not equal that of the Wellingtonias, but the girth of one specimen of gum, *Eucalyptus amygdalina*—the Almond-leaf Gum—is recorded as being sixty feet at some height above the ground, and eighty feet lower down. This tree was found growing at Victoria, in the Dundenong district at Fernshaw, and rose to a height of 430 feet, rising 380 feet before throwing out a branch, the height of the topmost twig being 450 feet. Many rates of Growth have exceeded those just indicated. Some *Eucalyptus* seed planted in Algeria in 1862 had formed young trees in twelve years of a circumference, at one metre (39·37 inches is the length of the metre) from the ground, of 1·52 metres, or nearly sixty inches. One tree measured after nine years only from the planting of the seed 1·57 metres, or more than five feet, in circumference. A fallen and dead *Eucalyptus* tree was discovered during some explorations in Gippsland, Victoria,

by the State Surveyor of Forests, on the banks of the Watts river. It measured as it lay 435 feet from the roots to the top of the trunk ; but as its crest was broken off, and the diameter of the tree at the fracture was three feet, the height when actually growing must have been, it was estimated, not less than five hundred feet. A *Eucalyptus* planted in Prince's Park, Liverpool, increased twelve feet in height in one summer (1877).

Health-giving Trees.

WE all know the secret of the beautiful process by which trees in general promote the healthfulness of their surroundings. The combination of carbon and oxygen, known as carbonic-acid gas, respired by animal lungs, deleterious as it is to animal life, rejoices the trees ; for they breathe in this gas, assimilate the carbon of the compound to build up their substance, and give back to the air the health-giving oxygen. But certain trees have other and peculiar properties conducive to healthfulness ; and amongst these

is the *Eucalyptus*. Planted in marshy malarial districts—malarial because marshy—it absorbs by its roots the superabundant moisture, thus reducing the prevalence of malaria, and by the emanations from its leaves—essences wafted from their essential oils by the motion of the wind—it further purifies the surrounding air and wards off disease. This has been abundantly proved by experimental planting in unhealthy districts.

Heavy Woods.

EBONY is popularly supposed to be the only wood that sinks in water; but there are several other kinds of wood which have the same character. These are Box (Dutch), Indian Cedar, Lignum-Vitæ, Mahogany, heart of Oak, and Pomegranate vine. Cork woods may be said to occupy a position which represents the opposite extreme in the scale of comparison.

'Human Trees.'

GOOD mimicry is a great art; but it is an art which has always aimed at imitating 'animated nature,' not 'still life.' What will be said, however, of the attempts of the clever Bheel robbers of India to 'personify'—if the word may be allowed—trees? When followed by mounted pursuers over plains affording no sheltering trees or shrubs, but only the blackened trunks of trees left standing as the ruins of forestal conflagration, these crafty plunderers have been known to seize a momentary opportunity afforded them of flinging down their plunder in little round heaps, which, covered with their round shields, have looked in the distance exactly like heaps of earth that have been noticed scattered about upon other parts of the plains. Then, seizing the nearest sticks, they have —standing perfectly still—thrown themselves into contorted attitudes, and have actually succeeded in deceiving their pursuers, who have rushed unsuspectingly by them. Here is the account by one writer, the Rev. J. D. Woods, of one of these tricks of mimicry. Mr. Woods says, 'Before the English had become used to these manœuvres a very ridiculous incident occurred. An officer with a party of horse was chasing a small body of Bheel robbers, and was

fast overtaking them. Suddenly the robbers ran behind a rock, or some such obstacle, which hid them for a moment, and when the soldiers came up the men had mysteriously disappeared. After an unavailing search the officer ordered his men to dismount beside a clump of scorched and withered trees, and the day being very hot, he took off his helmet and hung it on a branch by which he was standing. The branch in question turned out to be the leg of a Bheel, who burst into a scream of laughter, and flung the astonished officer to the ground. The clump of scorched trees suddenly became metamorphosed into men, and the whole party dispersed in different directions before the Englishmen could recover from their surprise, carrying with them the officer's helmet by way of trophy.' The walking of Birnam Wood to Dunsinane pales, as an exploit, before the cleverness of these Bheel robbers.

Icicles.

THE beauty of hoar-frost has been admired by thousands; yet those who have not seen it in a forest have lost the magnificence of its display.

Not only, however, in the miniature form of Icicles called hoar-frost are trees seen. In some cases, though rare ones, winter's icy fretwork is shown on a far larger scale where frost and rain together, as seen by travellers in Russian forests, bow down the trees with sparkling chains. Around the tiniest twigs ice an inch thick has formed, and, aggregating on the plentiful spray of Birches, has bent these slender, graceful trees to the ground. Incrusting trunks and boughs and twigs and smallest spray, these flowers of the frost must indeed have presented a beautiful sight when the sun shone out in splendour. No fairy-world creations could equal in brilliancy such a display. The proportionate weight of the icy coating of boughs of trees and of the boughs themselves suggests an interesting inquiry, which may be answered by one or two facts that will prevent surprise at the circumstances that branches, and even whole trees, are sometimes borne down by the weight of ice upon them. In the case of one limb that was weighed with ice upon it, it was found that the weight was two pounds and three quarters ; but, when the ice had melted, the wood weighed only two ounces. In two other cases which were tried, the wood in one weighed three ounces only after the ice had melted, whilst ice and wood weighed four pounds and a half;

and in the other the total weight of iced wood was thirty-two pounds, and of wood alone two pounds.

India-rubber.

MARVELLOUS, indeed, are the contributions of vegetable sap to the pleasures of life. Our drink, our food, our dress, and a vast number of things which art and manufactures provide for our use and enjoyment owe their existence to plant juices; and the juices themselves are merely modifications, wrought into the particular taste, colour, and consistency in which we see them by the wondrous organization, and under the subtle and unexplainable influences, of plant tissues. Sometimes a small plant, sometimes a shrub, and sometimes a tree furnishes the sap for a useful or beautiful product. In the case of the useful India-rubber, a tree—some sixty or seventy feet high, having an unbranched stem frequently fifty feet high—is the source of the originating sap. The long, oval, leathery green and handsome leaf of *Ficus elastica*, the Indian caoutchouc tree, is

probably known to many visitors to hothouses in the form of a small and pretty greenhouse plant, rather than as the producer of India-rubber. In its wild state it grows amongst rocky *débris* on mountain sides, and will reach a height of as much as twenty-five feet, and a circumference of three feet, in four years. For collecting the elastic gum or sap, soft clay troughs are made and placed around, so that they stick to the trunk of the tree, in which incisions are then made with knives or with picks. The sap slowly oozes out from the incisions and flows down into the extemporized troughs. At first it is white and milky in appearance—indeed, it is sometimes drunk by the native gatherers—but it changes colour in a short time and becomes firm and elastic. Boots and other articles of utility and fancy are made by the natives of Brazil whilst the juice is soft and pliable; and with pointed sticks or quills figures for ornamentation—representations of flowers and leaves—are made upon the soft material. Once a fortnight the trees can be tapped for their valuable juice; but during the prevalence of very wet weather there is generally a cessation of the collecting operations, because at those times the juices, from the excessive presence of moisture, are too watery for use.

Insects and Leaves.

NOTHING in the whole round of animated nature is more marvellous than the metamorphoses of Insects. The mystery which still enshrouds the process by which—in conjunction with the act of incubation, or with the other methods whereby warmth is made to promote and stimulate the development of the germ of life enclosed within an egg—the apparently crude embryonic mass becomes a living creature, organized, with marvellous perfection,—the mystery, we say, of this process, wonderful as it is, is less wonderful than that by which creatures first developed from eggs pass through stages of existence, during which their entire nature is changed. How different is the pupa from the caterpillar! and how marvellously different is the Insect we call a butterfly, with its delicate and beautiful 'feathers,' and its intensely gorgeous colouring! Deeply interesting, too, it is to note the curious ways adopted by various Insects of preparing for the mysterious changes in their state. Some of them spin for themselves—and the spinning alone is a marvellous and beautiful process—a delicate shroud of varying form in which to undergo their transformations. These shrouds are sometimes suspended to bushes, or other objects,

and sometimes prepared as a lining to crevices in walls and holes in the earth. At other times the naked pupa is hidden in the ground; or the transformation from one insect form to another may take place under water. The entire subject of insect metamorphosis is full of a strange interest, and furnishes abundant food for thought and study. But it would be curious and interesting to obtain an approximate estimate of the amount of green food consumed by Insects in the caterpillar state in one day throughout, say, a forest of moderate extent. One of the most extraordinary facts in the natural history of caterpillars is the rapidity with which they devour food, and increase in size and weight, in the period between hatching and transformation into the pupa state. The larva of the *Sphinx ligustri* weighs, for instance, at the moment of leaving the egg, about one-eightieth of a grain. 'At about the ninth day,' says a popular writer—Mr. Martin Duncan—on the transformations of insects, 'it casts its second skin, and then weighs about one-eighth of a grain; on the twelfth day it changes its skin again, and then weighs rather more than nine-tenths of a grain; on the sixteenth day it casts its fourth skin, and weighs three grains and a half; and on the twenty-second day enters its sixth and last skin, and weighs very nearly twenty grains; but on the thirty-second day, when

it has acquired its greatest size, it weighs nearly 125 grains; so that in the course of thirty-two days this larva increases about 9976 times its original weight. At this period it is sometimes more than four inches in length. But this is not the greatest weight that the larva attains. One specimen, which was bred in its natural haunts, weighed $141\frac{7}{10}$ grains; so that in this instance the insect had increased at the rate of 11,312 times its original weight. But great as is this proportion of increase, it is exceeded by some of the larvæ. Lyonet found that the larva of *Cossus ligniperda*, which remains about three years in that state, increased to the amount of 72,000 times its first weight! This amazing increase is occasioned chiefly by a prodigious accumulation of fat, which exists in a greater quantity in this than in other larvæ.' Few of the insect inhabitants of a forest are more curious and interesting than the gall flies, which produce such strangely abnormal excrescences upon the leaves and twigs of oaks, and of other forest trees. Amongst these one of the most remarkable is the Oak-gall Insect (*Cynips terminalis*). The gall-producing *Hymenoptera* form a separate group. They are small and insignificant-looking insects, and they have the curious power of being able to stimulate a considerable number of different plants to develop the curiously abnormal 'galls' of

different kinds. The *Cynipsidæ* contains the genus *Cynips*. The same writer just quoted says, 'The *Cynipsidæ* have an oblong and very convex body, the abdomen of which is attached to the thorax by a very thin pedicle. The saw ovipositor is very curiously made; it is very long and slender, and is twisted up in a spiral form within the abdomen of the female when it is not required. But when the insect has made up its mind to lay an egg, having chosen the proper spot, the muscles of the abdomen suddenly unfold this spiral, and the ovipositor is straightened, and thrust instantaneously into the plant. The *Cynipsidæ* are found everywhere in spring and summer. When about to lay, the females take great trouble to seek a good place on a proper plant; they make a puncture with their long ovipositors in the twig or leaf, and deposit either one or a considerable number of eggs. When the puncture is made the Insect spreads a secretion over the wound, which is of a very irritating character; and it is believed to excite the nutrition of the vegetable tissue to develop irregular masses of its cellular structures. There are multitudes of plants; and generally the shape of the gall differs in each, and is produced by different Insects. The Oak Trees afford a refuge for and nourish many kinds of gall flies which do not spare the trunks, the twigs, or the roots.' To Insects, indeed, the

Oak is a veritable forest in itself; much more, in fact, than 'a garden.' 'The branches of the Oak in the spring-time,' says Mr. Duncan, 'are often covered with nodules, some of which are very large and irregular in shape. Their surface is smooth, their colour light green, passing into red in some spots, and there are usually several on a twig close to each other. They are constructed on a different plan to those of the gall leaf Insect, for they contain twelve or fifteen cellules or more, each of which contains a larva. These kinds of *Cynips* fly in the middle of the summer, and there are probably two generations in each year. They are called *Cynips terminalis*, on account of the female. The sexes differ much in their shapes and colour; the male has large transparent wings, and its body is of a uniform bright fawn colour; whilst the female has no wings whatever, and is brownish, the end of the abdomen being of a shiny black tint.' 'It is very curious,' remarks the writer already quoted, 'to notice on the leaves of Willows and Sallows by the river-side little spots that look like saliva. If this matter is removed a larva or a nymph may be detected. It is called in England the cuckoo-spit, or frog-hopper, and is commonly found frequenting garden plants. This insect is called *Aphrophora spumaria*. The larva and pupa invest themselves with this frothy secretion, in

which they lie hid until they complete their transformation. The frothy matter is vulgarly supposed to be really the spittle of the cuckoo. The larvæ are quite destitute of any wings, and they are only rudimentary in the nymphs. The adults have legs fitted for leaping, and they suck the juices of plants with the aid of their suckers.' There are few people acquainted with the country who are not familiar with the 'whirr' of the cockchafer, the history of whose transformations during the three years which are consumed in the process, is most interesting. The locust-like consumptiveness sometimes developed by the cockchafers, as beetles, in those years when they appear in large numbers, pales before the devouring greediness of the Insects in their larva state, in which condition, as is well known, they oftentimes do serious injury to the agriculturist. Yet from the naturalist's point of view the life history of the cockchafer is deeply interesting and instructive.

Isolation.

'IT is not good for man to live alone' is an expression which aptly illustrates the human need of society; and just as sociability is needful for man, it is also needful for trees and, indeed, for all vegetation. Gardens and parks are often laid out with trees in Isolation, and though for a time they may appear to thrive, and perhaps even to withstand the force of tempests, the position is uncongenial, and they must in time succumb to it. The natural home of trees is in the wood or the forest. They are eminently social. Both the radiating heat of the earth and the moist emanations from the ground are essential to healthy plant-life. In the spaces between trees grown in Isolation, cold, cutting, and killing winds come in, the tempest gets its footing, and the leaves which fall to the ground and in the calm and stillness of the forest lie and rot, forming leaf-mould, and returning in due time to the earth the chemical substances taken from it by the growing trees, would be whirled away. If man plants a solitary tree alone in a plain, and that tree can escape the unfriendly influences to which its Isolation would subject it, it will soon supply the conditions natural and essential to its proper growth and prosperity. It will shed its seeds

around it, and these will grow up and form other trees, which will encompass the parent tree. The offspring will produce offspring of their own, and in time the natural home—the forest—of all trees will be produced.

Joined Trunks.

AMONGST abnormal growths trunks that touch and then cohere to one another are curious and interesting, and of such peculiarities there are many instances. At a short distance from the Bishopsgate entrance-lodge in Windsor Park two large Beech trunks which appear to spring from the same root, but may possibly be distinct, are united to each other at about fourteen feet from the ground. Near Boston two Oaks, growing about five feet apart, have joined their trunks some ten or twelve feet from the ground, forming an arch by their combination. The height of the twin trees is about forty feet. A curious instance of abnormal growth was discovered many years ago—in 1818—near Baden-Baden. The bole of an Oak had parted into two limbs, and these, after proceeding

a short distance, had again become united into one trunk. Two Elms at Leybourne Grange, Maidstone, growing two feet from each other, came together at about seven feet from the ground, the junction being effected by a branch from one of them, two feet and a half in diameter, having grown into the substance of the opposite tree. Two Limes which grew side by side in the parish of Bromsberrow, in the Malvern district, joined limbs and roots. Two Willows at Bransford Bridge, in the same district, have become united by a transverse limb; and the fact that such junctions may, and do, take place makes it probable that some trees of abnormal and unprecedented size may be in reality separate trees that have grown together. In Arundel Park there is a curious illustration of Joined Trunks; but these are twin trunks of the same tree, and not trunks of different trees. The tree is a Beech which grows on the banks of the lake at Arundel Park. The Beech in question grows on the slope of the lake side. From the root two trunks rise, one being nearly perpendicular. The other—the one nearer the water's edge—leans over the water at an angle of 50°. The junction is effected at eight feet from the ground, and is made by a stout arm which runs in almost a straight line from the upright to the slanting trunk. The tree is not quite fifty years old, and it

is noticed that a swelling like that of the bole of a tree takes place at each end of the joining arm. The length of the latter, when measured in 1882, was three feet, and its diameter from seven to nine inches. It has been suggested that the parts of the stems below the arm were once, perhaps, roots or underground stems, and that their growth upwards has caused them in rising above the ground to become stems. Such a theory might render it more easy to account for the junction; but however this has been effected, the appearance of the tree is certainly very remarkable. Some year or two ago the editor of the *Torrey Bulletin* published the following statement:—'Those who have taken a trip by stage-coach from the steamboat landing at the foot of Lake George to Fort Ticonderoga have, perhaps, had pointed out to them by the driver, at a certain point on the route, an instance of a singular sort of adhesion, where two trees of different genera—an Oak and an Elm—are so closely and firmly adherent for about three feet above the ground line as to form but a single trunk, which is apparently covered by a continuous bark.' The appearance of this paragraph, republished in *The Journal of Forestry*, elicited from a correspondent of that magazine a statement published in the issue for December, 1882. This correspondent, whose letter appeared under the initials

'W. B. M.,' said, 'By the fact of your quoting the editor of the *Torrey Bulletin* as *responsible* for the statement, I imagine you think there may be some doubt of the truth of what he says. I can, however, tell you of a similar case in this district. In this instance an Oak and an Ash Tree have so united that they form one trunk for about six feet from the ground. The circumference of the trunk is, I believe, about fourteen feet; but as it is some years since I measured them, I only state what I *believe* to be the size. These trees are so thoroughly united that no person would identify them as two trees except by the different growth of the heads.' A remarkable Fir growing near the baths of Alliaz, in the canton of Vaud, Switzerland, having the exceptional circumference at the base of thirty feet, sends out, at a yard from the ground, seven enormous branches, which, bent and gnarled at their bases, form a sort of floor or platform before they assume their upright growth and run up parallel with the main trunk. Two of them are connected with the principal stem by side branches, which join branches and stem together, forming a very curious 'freak of nature.'

Laburnum.

FEW objects are so bright in the floral world as the Laburnum when fully decked with its 'golden chains.' Once only in the year is it allotted to us as a rule to see this bright display, but occasionally in nature there are curious departures from normal habits. In the town of Tuxford, Nottinghamshire, a Laburnum tree flowers twice yearly, in early summer and in autumn. There are probably other, though rare, instances of this double flowering. Beautiful as the Laburnum is, it is dangerous, because poisonous. The scientific name of the common Laburnum is *Cytissus laburnum*, and hence the poison contained in it—in its bark, flowers, seed-pods, leaves, and roots—is called cytisin. The poison was first discovered by Husemann and Marne in 1864, though doubtless it had long before that time produced ill effects. So small a quantity as the hundredth part of a grain, injected under the skin of a cat or dog, is sufficient to cause immediate death. Adults and children have frequently been poisoned by this substance. The eating of ten seeds only would kill a child.

Larches in Scotland.

IF one part of the British Islands more than another is famous for the abundance of that useful and valuable tree, the Larch, it is Scotland; and an interesting account upon which we have lighted records the circumstances under which, and the date when, this vigorous grower was first introduced into the land of Walter Scott. Here is the account as published in the year 1819 in a paper called *The Bee*:—'The first Larch Trees ever seen in Scotland were sent to the Duke of Athol at Dunkeld, in the year 1738, in two garden pots. They came from Switzerland, and were at first put into the greenhouse. By degrees it was discovered that they could bear the winter in Scotland without injury. They were, therefore, planted in the Duke of Athol's park at Dunkeld, very near the house. There they may still be seen, having grown in the course of eighty-one years, which have elapsed since they were planted, to the size of very large trees. Their circumference about a foot above ground is nearly eighteen feet, and at the height of eight feet the circumference is nearly fourteen feet. Thus in eighty-one years they have produced as much wood as an Oak would in the course of

several centuries. From these two parent trees have sprung all the Larches which *abound so much* in Scotland.'

Leaves.

HOW little are Leaves commonly understood! How great their beauty, how delicate their sensibility, and how vital their functions! They have been described as the heart, lungs, and stomach of a plant. They are, in reality, expanded cellular tissue, displayed to breathe the air and gather the sunshine so essential to the life of vegetation. Upon the delicate and often complicated system of veins which—composed themselves of cellular tissue—constitute the framework of the whole is exhibited the delicate surface skin called the epidermis, consisting of transparent and flattened cells. Between the upper and under epidermis there is an aggregation of cells very closely packed together, and containing granules of green matter called chlorophyll, the substance which, shown through the thin and transparent surface skin, gives to leaves their familiar colour. The leaf-stalk

and the veins are composed of fibro-vascular bundles of tissue, or fibres and tubes; the tubes having once been cells placed upon each other, but having had the partitions formed between them and separating them absorbed. These are the principal channels through which flows the sap. Why, many people have asked, are Leaves darker on their upper than on their lower surfaces? The reason is that the cells which constitute the cellular tissue of the upper parts of Leaves are more densely packed than those underneath, and the colouring matter being also more abundant and dense gives a darker shade of green. The under surfaces of Leaves, too, are more thickly covered by the stomata or breathing pores, and thus there is a looser arrangement of tissue, and these delicate organs, the veritable lungs of the plant, are protected by the greater density of the cells of the upper epidermis from the too powerful action of the sun's light and heat, and in this way, undue and injurious evaporation of the leaf moisture is prevented. As many as 170,000 of these stomata, or breathing pores, have been found on a square inch of leaf surface, and the differences in their number on different leaves is very great. A large Lime leaf contains over a million stomata! As so much of the food of a plant is obtained in a diluted—that is to say, a liquid—form from the roots, it is obvious that much of the

superfluous moisture must be given off after the solid matter contained in the water has been assimilated; and it is through the stomata that vapour is given off, whilst it is also through them that air is taken in for its carbon to be assimilated and its oxygen to be set free. The rate of evaporation of moisture from Leaves differs in different plants; but, as one instance of its amount, it may be mentioned that in a sunflower, whose leafy surface amounted altogether to thirty-nine square feet, not less than twenty-two ounces of liquid have been evaporated in twenty-four hours.

Lifting.

THE enormous upheaving power of the roots of trees has often been exemplified. In the case of a large Elm at Norwich, Connecticut, believed to be about seventy years of age, standing by a house, the upheaving power of the roots has lifted it one foot. The chimney of this house had been previously swept away by the encroachment of a huge branch pressing against it, and by its growth at length forcing it over on to the ground.

Lightning.

AMONGST the innumerable instances of the diversity of natural operations under circumstances which appear the same, may be mentioned the different and remarkable effects produced on trees by strokes of Lightning. Here are some instances. In a Lightning stroke of a tree at Darnaway Forest, Scotland, in July, 1879, a very curious effect was produced. The tree was a fine Oak, and, during a severe thunderstorm, a limb was struck that started from the trunk about four yards from the ground. The Lightning ran through the limb and into the main stem, which, though more than four feet in circumference at the point of entry, was snapped right off, and its upper portion, with the whole of the top, hurled off and away to a distance some twelve feet from the bole of the tree. After producing this mischief the electric fluid ran down the trunk to the ground, completely stripping off the bark, and tearing the solid wood of the interior into a number of fragments ranging in weight from half a pound to half a hundredweight, and these fragments it scattered in all directions, several of the larger pieces of timber being cast to a distance of as much as seventy yards from the trunk. It is generally noticed that the most dis-

astrous effects of Lightning on trees are manifested in the trunk and in the larger limbs, and this, we think, is probably owing to two circumstances. First, it is probable that the fluid does not, in most cases, strike a tree at one point only, such as the extremity of a particular branch, and run through it solely in one volume; but that it is dispersed amongst a number of points—points of twigs, boughs, and even leaves—and that it becomes concentrated in its downward passage towards the larger limbs and boughs. On this theory the whole volume of the electric discharge would be united when it reached the bole, as the smaller quantities would all run in the same direction, say, along their several conductors, the small branches, to the larger conductor, the main trunk, as rivulets run into a river. It is doubtless the moisture, in the second place, that makes the small branches attract the Lightning, for water is an excellent conductor. For the same reason the smaller branches are less liable to be disrupted; that is because they are better conductors, and because they have smaller quantities of electricity to conduct. The larger limbs and trunks being much drier and more knotted, and having a much larger volume of electricity to carry, are overpowered and shattered Probably it is the especial moistness of the Lombardy Poplar that, as referred to elsewhere in this

volume, causes it to escape injury when other trees are destroyed. So great is the attraction which water has for Lightning, that oftentimes it has been found that trees which have water at their feet are struck by Lightning where others escape—the moisture in this case extending, so to speak, from the ground through the trunk and branches of the tree in the direction of the lightning cloud. When tall trees are planted near a house which may have a stream or other piece of water on the side opposite to that on which the tree is situated, a lightning wave has been known to strike the tree, and, descending it for some distance, pass right through the house to the water on the opposite side. This very thing, indeed, happened to a house at Lancy in 1864. On one side there was a Poplar, and on the other side a marsh; and during a heavy thunderstorm a flash of Lightning, first striking the tree, passed through the house across its roof, setting it on fire, to the marsh. The fact that Vine leaves, which are especially moist and herbaceous, have an especial attraction for electricity proves the soundness of the moisture theory; and so harmlessly does Lightning in many cases pass into the moist and much-divided top of a tree—with its multitudes of small twigs and leaves—that birds sitting in their nests, it is well known, have remained uninjured amongst the upper branches when dis-

charges, which have torn the trunk and half destroyed the tree, have passed between them. It is, of course, as is well known, the moister composition of the human body which has caused the death of men who have chanced to attract Lightning to pass through them when accidentally standing against tree trunks during thunderstorms —the flash forsaking the trunk when it has reached their bodies. A Silver Fir, fifty-one years of age, at Dalphinton, Scotland, was, on the 6th of July, 1880, struck by Lightning and shattered in a remarkable way. Two flashes were observed almost simultaneously in the neighbourhood of this tree. One struck and fused the iron wire of an adjacent fence ; the other struck the Fir some thirty-five feet from the ground. It was doubtless struck higher up, but the first injurious effect was noticed at that point where the tree was cut in two, the top being thrown to some distance, and resting where it fell in an upright position. In its progress downward the electric fluid shattered some fifteen feet of the trunk, and tore off two large limbs, hurling one to the east and one to the west. The remaining twenty feet of trunk was split down to the ground, one large splinter burst out and driven away, and the remainder left standing, but having the bark partly stripped off.

Lime Leaves.

EVERY one has admired the beauty of the Lime leaf, whose delightful colour of golden green is so refreshing and grateful in the spring to the inhabitants of towns; and the tree is too well and widely known to need any introduction. But it is known to probably very few people that the leaves of this beautiful town tree are very pleasant to the taste and very wholesome, and that they may be eaten raw as salad, or boiled as a vegetable. The fact is, perhaps, not one of much importance, but possibly some travel-worn wayfarer, hot, dusty, tired, and thirsty, or it may be hungry, may be glad to know that he can partake—and with benefit—of Lime Leaves.

Limits of Tree Growth.

THE causes which promote or repress growth are often not easy to understand; and trees frequently follow a certain wayward fancy in frequenting or absenting themselves from altitudes

above the sea. Lines, indeed, may be drawn above which the forest region does not extend. In the Alps it does not extend beyond 6400 feet above the sea level, although individual trees—these small exceptions will always occur—may be found growing at an altitude of a little more than 7000 feet. Yet in the Himalayas trees grow at an elevation of 11,800 feet above sea level; in the Andes higher still, or at a height of 12,130; whilst in certain parts of Thibet they grow so far above the level of the sea as 15,000, and trees have even been found growing at an altitude of 16,350 feet.

Lombardy Poplars.

THOUGH an introduced and not an indigenous tree, there are none of our sylvan friends better known or more popular than is the Lombardy Poplar. It seems to grow freely and healthily almost everywhere, by stream, by meadow, and by house. In its tall, upright, spire-like form it possesses great dignity; yet its bright, glossy, 'twinkling' leaves seem to add a delightful fresh-

ness to its surroundings. It is not often, perhaps, planted very close to a dwelling-house, and when it is found growing near houses it is frequently in a mangled shape, and if its side branches have not been touched its top has probably been cut right off. This handsome and interesting tree might not, perhaps, suffer this maltreatment if it were more generally known that it makes an excellent lightning conductor; and it is a curious fact that, either from its particular shape or on account of the peculiar conformation of its tissues, but more probably on account of the moistness of its wood, lightning flashes which would shatter many other trees pass harmlessly and quietly down the stem of this Poplar. Lightning, too, has a preference for Lombardy and other Poplars, and it has been especially noticed that it often avoids other contiguous and taller trees, and selects the Poplar for its 'short cut home.'

Longevity.

MUCH speculation has been indulged in at various times as to the length of time during which trees of particular kinds may live; but anything like an absolutely accurate estimate

is obviously impossible. Approximation to exact knowledge is all that can be obtained. Such an approximation, however, is interesting, and here it is. The Cedar has been known to live 2000 years; the Cypress, 800; the Elm, 300; the Ivy, 335; the Larch, 576; the Lime, 1100; the Maple, 516; the Oak, 1500; the Olive, 800; the Orange, 630; the Oriental Plane, 1000; the Spruce, 1200; the Walnut, 900; and the Yew, 3200. Many instances may, of course, be given of *presumably* greater ages, but not, we think, upon any really reliable evidence. The existing Cedars of Lebanon, for instance, are supposed, as we have mentioned elsewhere, to be contemporaries of those cut down by Solomon for the building of the Temple. This theory, however, is not, and cannot be, put forward on absolutely tenable grounds. But whatever facts might be proved, or, rather, however forcible reasons for the suggested age of a tree may be in a particular case, it may be regarded only as an exception to a rule. The figures we have indicated will at least furnish an idea of the comparative longevity of different trees.

Luminosity in Wood.

THE phosphorescence of the sea has been a common object of admiration, but few persons, probably, have noticed the Luminosity of Wood. Yet the peculiar appearance of a phosphoric light has been observed in tree stumps extracted from the ground. One case to which our attention was called was that of a stump of a Spruce Fir taken from the ground. At night this piece of wood shone so brightly that it was almost possible to read a book by the light given forth. There have been other examples furnished of the Luminosity of Wood, especially of wood in a decayed or half-decayed state. The explanation of what might seem strange and inexplicable is not that the wood itself is luminous, but that decay generates the growth of fungus, and certain species of fungus, whether growing upon wood or not, do, at certain times, exhibit phosphorescence. We say at certain times, because the phenomenon is only noticeable in certain states of the atmosphere; and here mystery and inexplicability come in, for the motive cause is not easily shown. The phosphorescence of the sea is much more prominently noticeable at some times than at others, and similar conditions of the atmosphere doubtless affect to a greater or less

extent the Luminosity of Wood. That the fungus upon decayed wood causes the phosphorescent light, has been proved by the disappearance of the light from the wood on the scraping off of the fungus.

Matches.

ONE of the most useful articles of commerce is made from one of the most beautiful of trees. Who has not admired the bright, 'twinkling' leaves of the aspen (*Populus tremula*)? They exhibit the joyousness of motion and glint in the sunlight when no perceptible breeze is blowing; and, curiously enough, there is a certain similarity between the bright activity of the leafage and the character of the timber, which is brittle and easily splintered, and burns brightly and rapidly. Hence it is just the wood for Matches, and the manufacture of these forms one of the most important and one of the most flourishing of the industries of Sweden—an industry which has greatly extended in recent years. In the match factory at Zarnow alone about forty thousand cubic feet of aspen wood are annually used for the manufacture of Matches.

May Woods.

THE heat and glow of summer have not yet come; nor the sultry glare that makes delicious the coolness of greenwood depths. Nowhere, in the full flush of the perfect season, is mere existence so enjoyable as in the shady tangles of a forest. In open field or plain, or in the sunny glades of the woodland, the sweet voices of birds and the musical hum of insects are oftentimes hushed by the oppressiveness of summer noonday. It is not so under the leafy arches of verdure. Screened from scorching rays, and gently nursed by soft caressing vapours, foliage and bloom put on their richest hues; the sense of smell is touched luxuriously by perfume from many a flower; the eye is charmed by the lavishness of colour, and the ear by the dreamy tinkle of the flowing stream. Here is no siesta. There is rest and quiet repose for many of the woodland inhabitants, but no slumber; for the air is melodiously filled with bird and insect notes—notes of happiness and joy. Animated nature cannot sleep in the bright daytime. But this season of fulness has not arrived. The breath of spring is upon the woods. It is the time of expectancy and love, of freshness and vigour, of buoyancy and young

beauty. That mysterious and wonderful principle of nature called *growth* is in full operation. Deftly formed coverings, embrowned by the rough touch of their wintry exposure, are being rapidly cast away to disclose green gems, softly enwrapped by cases of silk. Others, long since impatient of their frigid durance, are swelling towards the heyday flush of leafage. From amidst the delightful greenery—perhaps the most vivid of the woodland foliage in early spring—of the Hawthorn sprays, the cream-coloured, unopened blossoms are just about to exhale their delicious perfume. The sweet 'precursor' of delightful May—that ever-beautiful flower, the primrose—has scarcely gone from hedge-bank, copse, or dell; nor the fragrance of the bluebell from hyacinthine nooks; but these lovely associates of spring are paling before the burst of floral splendour which ushers in 'the May.' And let us not forget the 'voices' of the season—the 'cuckoo-song,' which sweetly echoes through the woods, and the song of the queen of the night, whose bubbling music floats deliciously in the soft atmosphere, and comes to us as moonlight harmony.

Milk Trees.

A TREE has been described by a South American traveller that produces milk. In his travels he had noticed a number of trunks of the masserabunda, or Milk Tree, which had been notched to obtain the milk. The tree is described as 'one of the noblest of the forest, rising with a straight stem to an enormous height;' the timber being 'hard, fine-grained, and durable,' and 'valuable for works which are much exposed to the weather;' the fruit also being 'eatable and very good, the size of a small apple, and full of a rich juicy pulp.' But it is from the bark that the milk is produced when an incision is made, and it is said to be rich and thick, somewhat of the consistence of thick cream, and improving the flavour of tea and coffee when used with these beverages. When exposed to the air for a short time the 'milk' hardens, and, in fact, forms an excellent glue. It is difficult to distinguish it, except for a rather peculiar flavour, from actual milk. An analysis of this milk has been made by a Frenchman, M. Boussingault, and was sent to the Paris Exhibition. It was shown that it approached very nearly in its composition to the milk of the

cow, and contained fatty matter, sugar, caseine, and phosphates, in larger proportions than in equal quantities of the milk of the cow.

Mistletoe.

QUESTIONS have often been asked as to the number of trees on which Mistletoe has been found growing, and many statements have been published on this subject. Some years ago a correspondent of *The Journal of Forestry* stated that though reported to grow on the Ash, Beech, Chestnut, Elm, and Oak, he had vainly tried to propagate it on those trees; but he added that he had seen it growing on the Apple, Lime, Maple, Poplar, and Willow, and on no other trees. He said further, 'The propagation is a very simple process, consisting of merely bruising the berry, removing the outer skin, and rubbing it on to a protected part of the tree. A great enemy to the seeds is a small snail about the size of a pea, which often devours them after they have begun to germinate. The seed is triangular in shape, and at two of the angles puts forth a shoot exactly like the horns of a snail. Sometimes both horns take root and form two

distinct plants, and it would be interesting to know whether they are male and female. I am inclined to think they are, but my experiments have not been continued long enough to enable me to decide.' *The Leisure Hour*, in 1873, gave a list of 'Mistletoe Oaks' in England, and these are the places where they were growing: At Hackwood Park, near Basingstoke; at Bredwardine, Herefordshire (discovered in 1871 growing in fifteen different places on the same tree); near Cheltenham; near Chepstow; at Badham's Court, Sunbury Park; at Dunsfold (Burningford Farm), Surrey; at Eastnor, Herefordshire; at Frampton Severn, Gloucestershire; at Haven in the ancient forest of Deerfold, Herefordshire; at Hendre, Llangattoch-Llingoed, Monmouthshire (discovered in 1870); near Knightwick Church, Worcestershire; at Lees Court, Kent; at Lindridge, Worcestershire; at Plâs Newydd, Anglesea, overhanging a double cromlech there; near Plymouth, by the side of the South Devon Railway; at Tedstone Delamere, Herefordshire (discovered in 1851). To these preceding statements as to the trees chosen as habitats by the Mistletoe others must be added. Mistletoe was found growing on a True Service Tree (*Pyrus sorbus*) in the Home Nursery at Brocklesby Park, in the north-eastern part of Lincolnshire; and in the park at Highfield, Strathfieldsaye, it was found in 1878

on the Lime and on the Whitethorn, and seeds of Mistletoe had germinated even on the Laburnum. Further, a correspondent, Mr. Thomas Hogg, writing from the Hampton Court Estate to *The Journal of Forestry* on the 7th of August, 1879, stated that in his neighbourhood Mistletoe was growing on the Ash, on the Birch, and on the Hazel—on the first-named tree in six places, on the Hazel in two places, and in one place only on the Birch. The list of Mistletoe Oaks must, finally, be further increased by the record of one on the Haven Estate in the parish of Aymstrey, Herefordshire; one in the parish of Gorke, Monmouth; one at St. Giles, Monmouthshire; and one in the neighbourhood of Usk. A popular writer on country subjects, Mr. Henry Evershed, has published accounts of Mistletoe trees that will furnish an interesting 'rider' to the preceding facts. Mr. Evershed quotes mainly from a contribution to the subject made by Mr. Edward Jesse, and the conclusion is that Mistletoe has been found—'On a Horse Chestnut tree in Bushy Park; on a Wych Elm in the wilderness of Hampton Court Palace; on a Mountain Ash in Hampton Court Park; on a Maple (*Acer opalus*) in Bushy Park; on the Common Maple (*Acer campestre*) in Richmond Park; on the Red Swamp Maple (*Acer rubrum*) near the ranger's house, Bushy Park; on the Acacia in the

Home Park, Windsor, and in the Stud-house Grounds, Hampton Park; on the Laburnum in Hampton Court Gardens, and on the slopes of Windsor Home Park. It is common on the White Poplar all around Windsor, and was found on the Black Poplar at Sutton Place, Surrey, and between Usk and Caerleon, Monmouthshire. Mr. Jesse received a specimen of Mistletoe found on the common Hazel at Godalming. It was found on the same tree at Malverley, Shropshire; and on the White Beam (*Pyrus aria*) at Cobham, Kent, near the churchyard; on the Large-leaved Sallow (*Salix caprea*) at Wood Rising, Norfolk, in the garden of the Rev. A. Roberts; on the Locust tree (*Robinia pseud-acacia*) at Ampthill, Bedfordshire, and in the Stud-house grounds, Hampton Court; on the Larch at Cold Weston, Shropshire; on the Ash (on the authority of the Rev. J. Herbert) in Monmouthshire; on the Service (*Pyrus domestica*), according to Dr. Hooper; on the Hornbeam, according to Dr. Hooper; on the Elm in Monmouthshire, and at Strensham Court, Worcestershire; and on the common Laurel, on authority which Mr. Jesse could rely upon. In France the Mistletoe grows on the Oak even more rarely than in England. De Candolle found it in France on the Lombardy Poplar, the Walnut, common Plum, and Medlar, and mentioned it as growing on the Spruce Fir, and Ash.

Mr. Loudon observed it, in 1814, on the Scotch Fir, in the neighbourhood of Magdeburg in immense quantities, and says that it grows upon the Olive in Spain and near Jerusalem, but not in France. He had it on the Cherry in his garden at Bayswater, and observed, in his "Encyclopædia of Trees and Shrubs," that it would be difficult to say on what dicotyledonous trees it will not grow.' Mr. Evershed added, 'This is by no means a complete list. I have seen the Mistletoe growing abundantly on the lime trees at Losely Park, near Guildford. It has been reported, on good authority, on the Spruce Fir in France and Switzerland, on the Vine in Italy, and on that other parasite belonging to the same natural order as itself, the *Loranthus europæus*. It grows also on Alder and Acacia, and on the Pear, and on no tree more freely than on the Apple.' It has also been found on the Sycamore and Medlar. It may be supposed, but it is at any rate the fact, that Mistletoe is injurious to the trees on which it grows. The roots penetrate the tree between the bark and the splint, and the layers of new wood growing over these, the roots become, in course of time, embedded in the wood and detract from its value as timber. There are two species of Mistletoe—*Loranthus europæus*, or the Oak Mistletoe, a deciduous plant; and *Viscum album*, the familiar evergreen Mistletoe.

Mistletoe on a Fir.

THIS curious and interesting parasite is widely known to occur on many trees, as we have just shown; but amongst exceptional and little known habitats are those furnished by the trunks of Scotch Firs, where it has been found growing. One of the mysteries of tree life is the reason for the preference of the Mistletoe for particular trees. How different in flavour are, for instance, the juices of the fruit-bearing Apple and those of the terebinthine Fir! and what can there be in common between the two trees to invite the Mistletoe? Yet although as a parasite the Mistletoe feeds upon the juices of its foster plant, its composition is always very different from the latter, though the elements of which it is composed vary according to the plant it grows upon. It contains, for instance, in a general way less lime, but more phosphoric acid, than the tree on which it grows. Just, therefore, as other plants will be found to contain differing proportions of the chemical substances that are in the earth from which they obtain them, so the Mistletoe takes up, in proportion to its particular needs, the elemental constituents of the tree beneath it.

Mulberry.

THE presence of old Mulberry Trees in gardens whose existence dates from the seventeenth century, is said to be mainly owing to an edict of James I., issued about the year 1605, in which the cultivation of silkworms was recommended, and packets of mulberry seed were offered to all who would accept and sow them. This edict rendered the Mulberry at that time a fashionable tree, and led to its extensive propagation in gardens. Considering the flavour and richness of its fruit, and the utility of its leaves in providing us, indirectly, with one of the most beautiful of fabrics, we may feel inclined to commend the wisdom of the Greeks, who dedicated the Mulberry Tree to Minerva. In his story of Pyramus and Thisbe, Ovid has rendered the Black Mulberry Tree, which was known in even earlier times, famous ; and in the sacred Scriptures—in the Psalms and in the Book of Samuel—it is also mentioned.

Nesting high.

THE writer who described a tree—alluding especially to the Oak—as 'a garden and a country' happily expressed its delightful and far-reaching usefulness. It is not all animals or birds, however, which can enjoy and use the spacious and refreshing mazes of a tree by disporting themselves in its branches, and we may suppose that the domestic fowl and duck, for instance, must get their pleasure from trees in ways other than that of climbing into them. But now and then curious departures from the normal state of things are observable, and birds, ordinarly unable by the long habit of domesticity to secure the pleasure of flying into trees, revert to their natural haunts amongst the branches. An almost amusing instance of this tendency was given, a year or two ago, on the Crawford Priory estate of the Earl of Glasgow, south of Cupar-Fife. The delighted 'cackling' of a fowl from high up in a tree, near the top, and some thirty feet from the ground, led to the discovery that a hen had taken possession of a wood-pigeon's old nest, and had laid three eggs in it. It was suggested at the time that perhaps the fowl had been impelled to revert to the natural asylum of a bird by the presence of hounds, the dogs having

probably disturbed its natural equanimity. Soaring ambition on the part of the domestic duck, in the direction of 'Nesting High,' is usually conspicuous by its absence. But a curious departure from the normal habit of this species of duck was noticed in Surrenden Park, where one had made a nest for itself, and deposited in it twenty-one eggs, upon the branch, twenty-five feet from the ground, of a Walnut Tree. To put matters straight, however, a pair of wood-pigeons on the same estate built a nest and laid and sat upon two eggs on the ground amongst some grass. This was in the year 1883.

Oak Leaves extraordinary.

WRITING to the author in August, 1883, Mr. E. N. Buxton, of Knighton, Buckhurst Hill, Chairman of the London School Board, said, 'I send you by post a remarkable pair of leaves which I picked this morning from a common Oak. It is only one instance of the extraordinary wealth of foliage this year. I have often seen leaves as large on the Scarlet Oak, but never on an English one.

The tree is a young one which had been cut back last winter.' The leaves sent to us were remarkable in two ways. First, they were twins—one leaf stalk, an inch and a quarter long, supported the pair, and from the apex of the stalk the mid-stem of each started at a rather acute angle. From the point of junction to the apex of the leaves the lengths were $7\frac{1}{4}$ inches and $8\frac{3}{8}$ inches. The width of the smaller leaf was $5\frac{1}{2}$ inches, and of the large one $6\frac{1}{8}$ inches. Both were somewhat thin, but the thinness may have been only apparent, and they were, in truth, an 'extraordinary pair.'

Orange.

FAMILIAR as is the fruit of the Orange Tree, and useful as are the essences produced by its leaves and flowers, it is probably not commonly known that it is the longest lived of succulent fruit trees. In one sense, of course, every tree is a fruit tree ; but in the present comparative statement even such a fruit-bearer as the Chestnut is not taken into account, for the famous Chestnut Tree on

Mount Etna is believed to be the oldest tree in the world. When we speak of fruit, however, in its luscious or most commonly understood sense, we think of apples, pears, plums, cherries, grapes, etc. Beyond the longest period of existence of such trees the Orange goes. It is known to have lived beyond a period of 450 years, and to have borne fruit for more than a hundred years. It is, too, so wonderfully hardy that scarcely any amount of bad treatment and neglect will kill or even injure it. It grows, too, rapidly when young, multiplying its fruit-bearing stems as it goes on, and so prolific is it that sometimes as many as five thousand oranges have been picked from one tree. It is a curious fact, too, that the essences extracted respectively from the leaves, flowers, and fruit are very different from one another.

Orchards.

NO species of fruit garden is more delightful than an Orchard, especially one of the 'old-fashioned' kind—large, grass-covered, undulating, and bordered by a wild, rambling hedge.

The wild flowers on the ground ; the lichen, grey and silver and gold, on the gnarled and twisted tree trunks ; the ruddy and golden fruit, the autumn tinting of the leaves, the dancing gleams of sunlight, the music of the birds, the occasional flitting of late butterflies, the absence of human sounds—these are some of the delights of a ramble through an old Orchard. Very different both in size and quality are Orchards, though the majority of these fruit collections are small. It would be interesting to learn the sizes of the larger of the Orchards of the world ; but the largest is believed to be one in the United States, situated on the east bank of the Hudson river, New York. Its owner is Mr. McKinstry, and it contains 24,000 Apple Trees, 4000 Cherry Trees, 2000 Chestnut Trees, 200 Crab Trees, 6000 Currant Bushes, 500 Peach Trees, 1700 Pear Trees, 200 Plum Trees, and 1500 Vines. In one year, from the 24,000 Apple Trees, a crop was gathered of 30,000 barrels of fruit !

Pears.

NOT the fruit, delicious and suggestive of pleasant memories as it is, but the tree is the subject of this note. Large trees are rare, for the genus excels by sweetness of flavour, and not by magnitude of form. Yet here are some remarkable instances of *size*. A Pear Tree in the little village of Garmouth, N.B., over a hundred years old, is forty feet high, and forty-two feet in the spread of its branches. Its trunk is five feet in circumference. The pears are 'golden knots' and are very sweet. Its huge branches had to be supported by means of planks running along the tops of eleven immense wooden pillars. In one year it is said to have produced 28,600 pears, and a single cluster numbered as many as 300. In another year a crop of 60,000 pears was expected! In the counties of Hereford (land of orchards) and Worcester there are many magnificent Pear Trees. One particular tree, the old field variety, growing on the turnpike road between Worcester and Tenbury, quite close to the village of Eardiston, had, in 1879, the following dimensions:—Height, 56 feet; girth of stem at ground, 14 feet; girth at five feet up, 12 feet; height of stem to first large branch, 11 feet; diameter of spread of branches,

62 feet. The pears produced were too numerous to count, but it bore pears enough sometimes to make three hogsheads of perry!

Pine Leaves.

NO trees are more widely useful than the Pines, which furnish the whole world with the soft, adaptable, and indispensable deal for the thousand and one purposes of the builder, the carpenter, and the furnisher; but it has not ordinarily been recognized that Pine Leaves—'needles,' as they are called because of their fine and pointed shapes—have any other use than that afforded by their beauty and by their suitability for the trees they grow upon; for the Pines growing in wild and exposed places would be, far oftener than they are, hurled to the ground, had they dense and impenetrable foliage, instead of the slender 'needles' between which the wind can pass. Fodder for cattle, however, is made by the Styrian peasantry from the leaves of the Pines. These are collected from boughs of the trees cut off in spring. The

boughs are laid by in barns, on the bare floors or on cloths, and left until—after exposure to free currents of air—they fall off. Then they are gathered together in heaps, dried in kilns or ovens, and ground in mills. Salt is added to the resulting powder—one part of salt to twenty-five of ground Pine Leaves—and, for feeding purposes, this powder is mixed with chaff and given in lieu of grains, turnips, or other farinaceous or vegetable food. It is said to answer admirably, and is both nutritive and wholesome for the animals.

Pine Paper.

THE buildings of the world owe a principal part of their material of construction to the wonderful Pine; and Pine timber, popularly called 'deal,' is everywhere used. We have not, however, been accustomed to look for our paper, as well as our timber, from Pines; but we may soon expect to do so, for in several of the United States young (sapling) Pine Trees, which are useful neither for wood nor for firewood, being too immature for the one

and too green for the other, are cut up—bark, leaves, limbs, and trunk—for manufacture into paper for roofing purposes or for pasteboard.

Pollen Rain.

MANY means are used for communicating the fructifying dust of flowers to the organs it is destined to reach. Bees and other insects carry it upon their legs, bodies, and wings ; the wind carries it from the stamens of one tree to the pistils on the same or other trees ; and it may drop by its mere weight from the upper and stamen-bearing branches of a tree to the lower and pistil-bearing branches. Sometimes Pollen is small in quantity ; at other times it is so abundant that it falls in thick showers and covers the ground. Certain seasons, for some mysterious reason, are more conducive than others to the formation of flowers on plants, and then the abundance of Pollen dust is so great as to fill the air in clouds and cause wondering astonishment. Coniferous trees have often an extraordinary quantity of Pollen, and amongst these

the Pines are remarkable, especially at certain times. So abundant has sometimes been the quantity of Pine Pollen that its sulphur colour has given rise to the belief that the abundant dust thickly thrown on the ground in places distant from the trees was actual sulphur, and coincident volcanic activity has been referred to as the immediate cause of the apparent phenomenon. Imagination has even gone so far as to conjure up a smell of sulphur to confirm the reality of the 'sulphur showers.'

Poplar.

POPLAR leaves have always given pleasure by their brightness, cheerfulness, and motion. They dance and gleam in the sunlight, and appear to twirl on their stems with the slightest breath of wind. This especial character of tremulousness has been particularly noticed in the Aspen—whence its name *Populus tremula*—but the leaves of all the species of Poplar Trees have a similar habit. Poplar leaves, however, are seldom looked upon as useful either for the good of man or of cattle; yet

by chemical analysis these leaves are proved to be excellent for fodder, being, in fact, especially nutritive ; their constituents being 20·68 per cent. of cellulose, 18·30 per cent. of fat, 47·22 per cent. of non-nitrogenous extractive matters, and 12·87 per cent. of protein. Of these various substances a large proportion are digestible and capable of being assimilated by animals, to the extent, indeed, of 40 per cent. of the cellulose, 79 per cent. of the fat, 65·5 per cent. of the non-nitrogenous extractive matters, and 55 per cent. of the protein. In Italy, indeed, these leaves have regularly for a long time been used as food for cattle, and the verdict of experts is that they 'will compare favourably with well-made trefoil hay of the finest quality.'

Protectors of Trees.

A TREE garrisoned by ants must be a somewhat remarkable stronghold. But such a tree exists, in the shape of a species of Acacia bearing thorns which are hollow, and leaves which produce honey from glands that are borne upon them at their bases, and sweet fruit-like protuber-

ances at their tips. In the hollow thorns the ants take up their quarters, and finding drink and food within their immediate reach, they are content to dwell upon the tree without any desire to go elsewhere. But they do much more than this. They forbid all other insects to approach, and, roaming continually and in their thousands over trunk, stems, twigs, and leaves, they constitute themselves a veritable garrison, and hold the fort most completely against all 'visitors.' Every visitor is an enemy, and they make short work of him or her or it by swallowing the intruder, if small enough. What the extent is of the daily slaughter by these particular ants of their smaller foes is probably not known, though doubtless it is considerable, for one colony of ants has been known to destroy in one day no less than a hundred thousand insects.

Pruning.

ONE of the most unpleasant sights for a lover of trees is that of trees in surburban gardens with large limbs lopped off close to the trunk. Oftentimes, doubtless, this is done to give light to

windows; but frequently there seems no particular reason for the hideous disfigurement of a beautiful object, and one can only ascribe the act of mutilation to the dislike of trees by the occupants of the houses near which they grow, or to an utter want of appreciation of what is beautiful in the ramification of a tree. Few of those who thus disfigure 'the Buildings of God' know the great injury which they inflict—an injury which oftentimes leads to the early death of the tree operated upon. Amongst those who profess to understand the subject, opinion differs very much as to the general effect upon growth of the cutting off of live branches; but in the case of large trees the amputation of large healthy limbs is universally admitted to be injurious, and a curious theory has been started by one writer on the subject, who thinks that there is some analogy between the capacity of human beings and trees, at certain ages, to bear the removal of limbs. Amputations when performed between the ages of thirty and fifty years are fatal, this writer remarks, in the proportion of one in every two cases, but between the ages of fifty and sixty-five one operation in every four only proves unsuccessful, and only one in every five is fatal in the case of children; and he is convinced that with very young trees—he instances those from under fifteen to twenty feet in height—and with

very old trees, after the period of most vigorous growth has been passed, the process of cutting off the larger limbs is less injurious than in the case of vigorously growing trees of from thirty years old and upwards. This view has been contested, but the subject is an interesting one.

'Puzzle Monkey.'

A VERY curious common name, though the designation is very appropriate, is that of 'Puzzle Monkey,' given to the species of Araucaria, the best known of which is the Chili Pine, or Imbricate-leaved Araucaria (*Araucaria imbricata*). The sharply spined, rigid leaves are so thickly set—overlapping—upon all the branches, and, in young trees, even upon the trunk, and the branches are whorled and twisted in such a remarkable manner, seeming, as has been aptly suggested, like 'snakes partly coiled round the trunk and stretching forth their long slender bodies in quest of prey,' that the attempt to climb it might well 'puzzle' even a monkey. It is a curious fact that whilst the

female tree grows to a height of more than a hundred and fifty feet, the male seldom exceeds fifty feet in height. A species (*Araucaria cunninghamii*) which grows largely in Queensland, rising there sometimes higher than two hundred feet, has been considered 'the most ornamental and useful tree' in that colony. The singular beauty of an Araucaria of such a height can be imagined even by those who have not seen it, and its wood, largely used in Queensland, is fine grained, strong, durable, when kept dry, and susceptible of a high polish. A curious feature of the tree is the white and transparent resin which, exuding from it, sometimes hangs like icicles three feet in length and a foot broad.

Rabbits.

THE lowly Rabbit is generally regarded as a feeder upon short herbage; but those who have much to do with trees know that these prolific and abundant rodents live largely upon young saplings, and make sad havoc in copses, gnawing at the young bark and any portion, within reach,

of the trees. Some five years since, however, an Oak sapling, twelve feet high, was pointed out—in a wood in Scotland—that bore distinct evidence of having had its top eaten off; and whilst speculation was indulged in concerning the manner in which an animal had managed to reach to so great a height, the doubt was settled by the statement that during the preceding winter the superincumbent weight of snow upon the tree had borne it to the ground, but without breaking the stem, and that it was whilst in that position that rabbits had gained access to the juicy young twigs and gnawed them off.

Rainfall.

IT has often been noticed how dry the ground is under trees for a long time after it has commenced raining, and it is well known that it takes a long time and a considerable Rainfall to thoroughly wet the ground of a forest where the trees grow thickly together. Similarly, forest ground, after thoroughly wetting, is a long time in drying, for the reason that its garment of trees prevents rapid evaporation of the moisture. It is

interesting, however, to note that Pine forests keep the ground underneath dry for a longer time than forests of deciduous trees, for their branches and leaves retain more than half of the rain that falls upon them, whilst other trees retain only about forty per cent. of the moisture received upon their heads, letting some sixty per cent. of it reach the ground. Long-continued rain would, of course, so thoroughly saturate the stems and leaves of any tree that all the moisture, after this thorough saturation, would find its way to the ground. More moisture is also given off into the air by Pine leaves than by others; so that, as M. Fautrat, a French scientist, stated in a communication he made some years ago to the French Academy, if the vapours of the air were apparent like fogs, we should see thicker vapours around the heads of Pines than around those of other trees.

Raining Trees.

ALL leaves exhale moist vapours, and, hence, cool and sweeten the air, because a leafy aroma is given off with the moist exhalations; but it is seldom that the vapours visibly

condense. Travellers, however, have reported that in Peru grows a tree called there 'Tamia-caspi,' or 'The Rain Tree,' which absorbs such an unusual quantity of moisture, partly from the surrounding atmosphere and partly by its roots, that it is compelled from time to time to give it off in the form of rain or showers of drops. So plentiful was the discharge stated to be that the ground underneath these trees was frequently converted into a bog. Its usual height was said to be fifty feet, and its circumference at the base nine feet. The peculiarity we have mentioned was said to be especially shown during summer droughts. So much for travellers' accounts. From more careful and scientific information it would appear that the tree in question grows at Moyobamba, in South America; that it is scientifically called *Pithecolobium saman;* and that the reputed 'rain' is merely the fluid excreta of *cicadas* which feed on the juices of its leaves. The authorities at Kew Gardens investigated the circumstances at the instance of a number of correspondents, and in one of the reports issued from the Gardens various theories concerning the reputed 'Rain Tree' of Peru were published. One of these published accounts of the tree was obtained from Mr. Spruce, a South American traveller, who wrote as follows of the Moyobamba 'Rain Tree':—'The Tamia-caspi, or

Rain Tree, of the eastern Peruvian Andes is not a myth but a fact, although not exactly in the way popular rumour has presented it. I first witnessed the phenomenon in September, 1855, when residing at Tarapoto (lat. 6° 30′ S., long. 76° 20′ W.), a town or large village a few days eastward of Moyobamba. A little after seven o'clock we came under a lowish spreading tree, from which, with a perfectly clear sky overhead, a smart rain was falling. A glance upwards showed a multitude of cicadas sucking the juices of the slender young branches and leaves, and squirting forth slender streams of limpid fluid. My two Peruvians were already familiar with the phenomenon, and they knew very well that almost any tree, when in a state to afford food to the nearly omnivorous cicada, might become, *pro tem.*, a Tamia-caspi or Rain Tree. This particular tree was evidently, from its foliage, an Acacia. Among the trees in which I have seen cicadas feed is one closely allied to the Acacias, the beautiful *Pithecolobium saman.* Another leguminous tree visited by cicadas is *Andira inermis;* and there are many more of the same and other families which I cannot specify. Although I never heard the name Tamia-caspi applied to any particular kind of tree during a residence of two years in the region where it is now said to be a specialty, it is quite possible that, in the space of twenty-one years that have

elapsed since I left Eastern Peru, that name may have been given to some tree with a greater drip than ordinary: but I expect the cicada will still be found responsible for "the moisture pouring from the leaves and branches in an abundant shower," the same as it was in my time.' Another scientific authority, however, Professor Ernst, of the University of Caracas, expressed a different opinion, and one agreeing with the theory of the 'rain' being a natural emanation from the leaves of the tree in question. He published his opinion in the *Botanische Zeitung* in 1876, at pp. 35 and 36. Referring the phenomenon to the same tree (*Pithecolobium saman*), he said, 'In the month of April the young leaves are still delicate and transparent. During the whole day a fine spray of rain is to be noticed under the tree, even in the driest air, so that the strongly tinted iron-clay soil is distinctly moist. The phenomenon diminishes with the development of the leaves, and ceases when they are fully grown.' Professor Ernst was of opinion that the liquid causing the rain was secreted by glands situated at the footstalk of the leaf, and that it was secreted rapidly, as proved by the circumstance that if the drops exuding were absorbed by blotting-paper they were immediately formed again. His theory, published as we have seen in 1876, would appear to have been estab-

lished a hundred and forty years previously; for in a book published in 1735, entitled 'A Journey Overland from the Gulf of Honduras,' at pp. 40–42, there is a similar account of this tree—it is apparently the same. The writer of this book, Mr. John Cockburn, says, 'Near the mountains of Vera Cruz (Guatemala) we came out on a large plain where were numbers of fine deer, and in the middle stood a tree of unusual size, spreading its branches over a vast compass of ground. We had perceived, at some distance off, the ground about it to be wet, at which we began to be somewhat surprised, as well knowing there had no rain fallen for near six months past. At last, to our great amazement we saw water dropping, or, as it were, distilling fast from the end of every leaf.' There is no doubt that, in this case, if the moisture had been rapidly secreted by footstalk glands, it might have poured off along the leaf, and thus have appeared to those standing under the tree to be flowing from the ends of the leaves as they, in their ordinary and natural position, hung with their tips downwards.

Relics.

BURIED trees and buried forests are continually coming to light, and showing the marvellous changes wrought, during geologic ages, in the condition of the vegetable world. Towards the end of the year 1880, whilst some borings were being made for water in the Wimmera district of Victoria, a tree was discovered 250 feet below the surface of the earth. It was dug through at the bole to a distance of six feet, and was probably more than that in diameter. The depth and position, considering the object of the well-diggers, prevented any further examination of the tree; but a number of fruit stems buried in the surrounding earth, and evidently belonging to this tree, which was probably part of a buried forest, were brought to the surface. In California, at San Bernardius, a tree, believed to be a Sycamore, was discovered at a depth of no less than 280 feet below the ground, standing upright. In this case, it was in boring an artesian well that the discovery was made. From these isolated and individual instances of buried trees, let us turn to a more important and interesting discovery, described by the Chicago *Lumberman*. Here it is: 'It is said that in Arizona, 240 miles west of Albuquerque, and not far from

the line of the Atlantic and Pacific Railroad, there is a wonderful petrified forest, which is described by a correspondent as follows :—"Few travellers have yet seen it, but the completion of the railroad will bring tourists in crowds. This freak of nature is accessible from Carrizo station, a place which appears very large on the map, but is in reality as yet nothing but a section house and water tank. Carrizo lies in the valley of the Little Colorado. In order to reach the forest one has to hire a horse or a buckboard at Holbrook, a station a few miles further west. Returning with the outfit to Carrizo, the traveller strikes off into the country across the Colorado, which at this season is low and may be easily forded in spite of its sandy bed. Beyond the river the trail leads over sand and shale through a level region covered with gramma and buffalo grass, and across a deer and antelope range. About ten miles from the railroad the path enters an immense basin, with gradually sloping and semicircular sides, surmounted by high banks of shale and fine white clay. In the basin is the curious forest. For some distance before reaching it the road is full of small pieces of broken branches, while here and there stumps of various sizes peer above the white sand. A drive of half an hour brings one to the heart of the forest, which, however, it is hardly proper to call a forest, because the

trees are no longer erect. But they are scattered over the surface of the great basin in every conceivable direction. Petrified stumps, limbs, and whole trees lie on every side. Immense trunks are broken and scattered over an area of three hundred acres. Some of them are five feet in diameter. Numerous blocks appear as fresh as if they had been only recently felled. Many of the smaller chips, especially from the hearts of the trees, have become thoroughly crystallized and sparkle in the sunshine. Those of amethyst tint are peculiarly beautiful, though every colour of the rainbow appears. In nearly every fragment the grain of the wood is plainly visible."' A remarkable example of a petrified forest under water had been, up to the year 1883, overlooked. What for a number of years had been regarded as moss formation on a bank under the waters of Lake Tahoe, was then discovered to be petrified remains of a forest. The position was described to be at the right of the steamers' course, between Tahoe City and Talloe House, and some two miles from Idlewild. Moss and slime had collected over the trees and obscured them ; but when these disappeared, and the water was clear, a very plain view was obtained of what was evidently the remains of a Pine forest, limbs and twigs being very distinctly made out. The trees lay at a depth of some fifty feet below the water's level, and

when some fishermen lowered grappling irons and pulled them up again, the irons brought up some pieces of the petrified wood. The area occupied by these interesting Relics is about two acres, and large weeds and Vines, in a petrified state, still are present entwined amongst the trees, through the branches of which fish now swarm in great numbers.

Ribston Pippin.

NO specimen of the much-appreciated Apple has, perhaps, ever become so well known or proved so great a favourite, as the choice-flavoured Ribston Pippin. Its history is as follows :—Some pips of this apple were brought from Rouen, about the year 1688, by Sir Henry Goodricke, Bart., of Ribston, Wetherby. They were all sown at Ribston, and five of them, it is said, grew into trees. Two of the five proved to be crabs, but three of them were good and eatable. Two of the three bore fruit, and one, the survivor, became the famous Ribston Pippin, and was destined to give its name

to one of the most delicious of fruits. The famous tree, however, the original in this country of species which are now widely known, was blown down in the year 1810.

Salt on Trees.

IT has been abundantly proved that after heavy gales of wind from the sea, Salt is deposited on the leaves of trees inland, and sometimes it has been found to thickly cover the leaves several miles from the sea. It has also been proved that it falls in rain, though, doubtless, in both cases its source is the sea. Amongst occasions when this Salt deposit on leaves has been especially noticed, was just after the famous gale of April 29th, 1881. The browned and withered, and even blackened, appearance of leaves after a strong gale from the sea has also been attributed to the action of Salt, and there is little doubt that, although the saline deposit may not effect all the injury that is noticeable on such occasions, it does alter the colour of leaves. Much of the damage noticed after great gales from the sea has, probably, been caused by

the great force and biting and blasting effect of the cold wind. That the source of the Salt deposited is traceable to the sea is, however, sufficiently proved by the fact that only those leaves on the windward side—that is, on the side facing the sea —have received the saline deposit. Near the sea one may often taste Salt in the wind, but the extraordinary incident of many great gales is the distance inland to which the mineral is carried. The tearing by the wind, through its great and terrific velocity, of the leaves of trees into shreds would, of course, produce a blasted appearance without the agency of Salt.

Soil.

APPARENTLY as simple as the medium—water—in which a fish lives is that or the principal medium—for as such we must regard the Soil—in which a tree lives. Yet it is much more complex, and varies far more in order to accommodate itself to the varying vegetable growths upon it. Stones and the matter we call earth are the obvious constituents of Soil; but

these must be subdivided into a considerable number of differing substances. The stony particles, large or small, from large pieces of rock to stony fragments called sand, are composed of differing elements, and 'earth' is a general expression which conveys no definite idea of the almost infinitely varying matters of which it is composed. Not only the nature of its constituents, but the proportion in which they are mixed or chemically combined, influences the character and condition of Soil. Here no elaborate description of the nature and quality of Soil will be attempted, but merely such suggestive remarks will be made as to induce an interest in an interesting subject. Lime, sand, clay, and vegetable 'humus' (as vegetable matter reduced, by decomposition, to earth is called) make up the substance of Soils, and these elemental substances are, in turn, made up of such chemical constituents as iron, magnesia, phosphorus, potash, silica, soda, and sulphur. Compactness and porousness give to Soil two very differing qualities, making them retentive of moisture or 'heavy,' and causing the moisture to flow rapidly away, rendering them 'light.' These two principal qualities are largely affected by the presence, in greater or lesser quantities, of sand. Much sand causes lightness and porousness; a prevalence of clay makes heaviness; sand and clay mixed forms 'loam,' which

is light or heavy according to the predominance of sand or clay, and rich or poor according to the presence or absence of the rich, fertilizing substances contained in vegetable earth. The depth or shallowness of Soil will, for many reasons, alter its character and affect its nature, by inducing other conditions which will produce the effects noticed. Its colour, too, produces a direct influence upon it; the darker this is the more heat will it absorb and the less will it reflect, and hence it will be warmer than if its hue were lighter. The presence or absence of water, too, or rather the abundance or scarcity of water—for all Soils contain some moisture—makes it cooler or warmer, and modifies its capability of affecting the vegetation upon it. How widely different these influences are is shown by the diversity of vegetation; so that a very 'common' substance—Soil—which presents little apparent variety, is the immediately disposing cause of most of the diversity of beauty noticeable in the vegetable world.

Spiral Growth.

TISSUES of plants often take a spiral direction in their growth. The tendrils of most climbing plants afford instances of this peculiar movement, and Darwin, by his numerous and interesting experiments, has shown that the leading shoots of a large number of plants turn round from day to day. An important part, too, of vascular tissue itself consists of spiral threads, which thicken the internal parts of such tissue, and assume the cylindrical or spiral form of wire springs. But Spiral Growth in the trunk of a tree is a very unusual occurrence. In the neighbourhood of Dunkeld, however, is a Spanish Chestnut, one of a row of very fine trees, that has a very remarkable series of twists in its bole. Between the ground and the top of this tree there are no less than six spiral turns.

Squirrels.

SCARCELY any animal can enjoy the sportive life of the woods so keenly as the Squirrel. How delightedly he skips from branch to branch and bough to bough, and when danger approaches, how keen must be his sense of security, as, high aloft, he looks down upon his would-be foe! How joyous, too, must be his taste of life, especially in summer! Endless leafy ways, and the free larder of the forest. We picture him eating nuts; but nuts (albeit his winter store may overlap the summer) he tires of sometimes, and, for change, he has all the sweet juices of leaf and flower as well as of fruit. People have sometimes wondered to see trees, especially Horse Chestnuts, with their twigs and blossom stems snapped, and have scarcely suspected the Squirrel; but this active, nimble little fellow loves the young pith of sweet juicy twigs, and bites them in two to get at it. Especially does he do this in the early summer, when the young wood is growing fast, and the sap is flowing freely. Nor is our active friend content to eat all the pith in the twig he first selects; for he goes from one to another, nipping and sipping, over, to him, spacious areas, injuring many trees, but freely ministering to his own free fancy.

Stinging Trees.

ALMOST every peculiarity is exhibited by trees; and travellers often bring remarkable accounts of the wonders of the vegetable world. We have been told of 'Trembling Trees'—the Trembling Tree being a species of Acacia, which puts itself in a 'mild commotion' when touched, and gets in a great rage, trembling violently, when transplanted, at the same time emitting a nauseating odour; of 'Smoking Trees,' a species of Mulberry that *at times* emits vapour like puffs of smoke; of 'Prehensile Trees,' such as the 'Bone Tree,' already spoken of in these pages; and of 'Rain Trees,' which discharge showers of drops: but there is also, according to the description of another traveller, a tree which, growing to a height of some ten or fifteen feet in Queensland, is, whilst pleasing to the eye, offensive to the sense of smell, and, moreover, a dangerous vegetable to approach. Here is one account of a traveller: 'Sometimes while shooting turkeys in the scrub, I have entirely forgotten the Stinging Tree till I was warned of its close proximity by its smell, and have often found myself in a little forest of them. I was only once stung, and that very lightly. Its effects are curious: it leaves no mark, but the pain is mad-

dening; and for months afterwards the part, when touched, is tender in rainy weather, or when it gets wet in washing, etc. I have seen a man, who treats ordinary pain lightly, roll on the ground in agony after being stung, and I have known a horse so completely mad after getting into a grove of the trees that he rushed open-mouthed at every one who approached him, and had to be shot. Dogs, when stung, will rush about whining piteously, biting pieces from the affected part.'

'Tongues in Trees.'

WE remember reading, not very long ago, a little paragraph which struck us very much from its happy suggestiveness. It was written by the Rev. Samuel Jenkins, curate of Munsley. There are really audible Tongues in Trees—for do they not discourse leafy music, and in a leafy language which is peculiarly delightful, when the wind plays through their branches? But the writer of our paragraph put a tongue in *his* tree. He was speaking of a remarkable Yew growing in Munsley

Churchyard, and which, from a calculation on the basis of De Candolle's method of ascertaining a tree's age by the number of rings it contained, must, he calculated, be 1656 years old. Its circumference at the bottom was 23 feet 4 inches. He added, 'Had our tree a tongue, as Shakespeare says that trees have, what a long tale it could unfold! How many strange incidents could it relate, even of the quiet little rural parish of Munsley! Surely man must have a hereafter, else the Yew Tree would laugh at his longevity, in comparison with its own, as he struts away his short existence here. The stripling Yew Tree planted last year could afford to laugh heartily at the Bradlaugh incident, because long centuries after he, according to his own account, will be annihilated, and his commotion utterly forgotten, the Yew Tree will be revelling in pristine vigour. Nay, man is surely better than a tree. If our calculation is correct, our Yew Tree was planted in A.D. 825. By whom? It was planted during the reign of Egbert, the last king of the Saxon Heptarchy, twelve years before he died. It saw the rise and fall of the Anglo-Saxon monarch, while it was yet a tender tree measuring fourteen inches in diameter. When Alfred the Great ruled with such marvellous wisdom, our tree could afford but very meagre shelter to man, bird, or beast. When the Danes arrived here,

our tree would only have increased two inches more in diameter. When William the Conqueror arrived, he would have found our tree only one inch and a half more. When King John signed the Magna Charta, it would have grown one foot ten lines more. When Edward I. subdued Wales, and added it to his own kingdom, it would not have increased another eight inches in diameter. Supposing Munsley Churchyard to have been the burial-place from that time till now, there are no less than three thousand generations of the "rude forefathers of the hamlet" sleeping quietly around our venerable tree, awaiting the resurrection. It must have witnessed the funerals of all these. What changes have taken place since it was first planted! How many times has the ownership of the parish changed hands? Thrones, empires, dynasties, have faded away since then. Names, illustrious in their day, are now buried in deep oblivion, the dust of ages hides them. Our tree still stands; its foliage is fanned by zephyr winds, and if no accident happen, many generations of our descendants will admire its majestic appearance.'

Trance.

THE fact of a tree being in a 'Trance' is hardly conceivable; but there is no doubt whatever that the differences of vitality amongst different members of the vegetable world are very great. Drought, exposure, and other 'privation' which would suffice to kill some species, will be passed through by others without injury. A foreign paper stated, some years ago, that one of its correspondents had found lying in a florist's outhouse in Amsterdam, 'a fine large trunk of an *Encephalartos langinosus*, which twelve months previously had come from the Cape. The tree was apparently lifeless, and had neither leaves nor roots. It had been planted when first brought from abroad, but from want of space had been taken up and thrown aside in the outhouse. It was, however, subsequently planted again, and, though for a whole year it gave no signs of life, it subsequently began to flourish, and ultimately became "one of the most splendid specimens of its kind."'

Treeless Prairies.

ONE explanation that seems reasonable of the treelessness of the prairies of Western America is that which ascribes their condition to the earlier practices of the Indians in annually firing them in order to add to the luxuriance—for the purpose of attracting their prey, the buffaloes—of the prairie grass. The grass, they found, from its marvellous hardiness and power of growth, immediately sprang up again after the conflagration. Prairie fires are still of not unfrequent occurrence, and the scorched ground refusing to grow anything but its crop of grass for some time—until another season at least—the tree growth was continually kept away. Many of the prairie fires are doubtless caused by the leaving of camp fires unextinguished, and others are occasioned, it is known, during hot and parching weather, by lightning setting the dry and easily combustible grass and dried vegetable fibres in a blaze. The fact of fires originating when it has been proved there are no hunters or other campers-out is a proof that their ignition is due to the electric fluid. These various causes therefore combine to devastate vast tracts of country, and, by preventing any large growth, to keep the prairies treeless wastes.

Trees from Leaves.

IT was gravely asserted by an Italian student of theology, Agostino Mandirola, a member of the Franciscan order, that Trees could be grown from Leaves, and he averred in a little book he published that he had raised trees from Cedar and also from Lemon leaves. Others since have made similar assertions, and one well-known physician, George Andrew Agricola, of Ratisbon, stated that the phenomenon could be produced after the leaves had been steeped in a liquor of his invention. But statements like these are mystical and uncertain. Many plants can be developed from the smallest divisions of mature specimens. What, in some large-growing species, appears to be leaves are in reality branches, or at least twigs. Green and leaf-like at first, the twig becomes externally hardened, and so soon as it has reached the woody stage it will grow into a separate plant if a piece of the joint at its base be detached with it. Joints have the power of producing roots, and a thing commonly observed is the rooting of a twig-joint on a growing tree, where the twig has rested on moist soil.

Trees in Towns.

AS sanitary agents Trees in Towns have been mostly considered; and less attention has been drawn, in the numerous discussions which have taken place on this important subject, to the relief and pleasure afforded by reposing the eye upon greenness in the arid and sunny aspects of our town streets. Health is thus indirectly affected in another way. The brain powerfully reacts upon the body; the mental condition of a man affects his physical state. A recent writer, in contending for the optical benefits conferred by the presence of trees in streets, remarked, 'Just that which was affected by the use of green or blue glasses in strengthening and sustaining the power of sight was attained, or at any rate much aided, by the presence of green in nature; and in streets the only method to procure this result was by planting trees.' He added that 'wherever opportunity exists nature provides green and blue, the same colour without the presence of yellow,' and that 'as the absence of colour produced snow-blindness, so in tropical calms, where the ocean presented only a white reflected light from a uniform glassy surface, reduced optical power would soon follow a long continuance of the absence of the blue colour,

which became immediately apparent on the motion of the waves.' Another consideration of importance is that the improvement, by widening, in the streets of modern towns gives, according to a theory which is at least plausible, greater occasion for planting trees than existed in the old times of narrow streets. The old narrow streets, it was contended, as they admitted less sunshine, were cooler than the modern wide ones, and the narrowness caused draughts of air to flow through them. Hence there was less possibility then than now for the collection and retention in the stiller air of noxious emanations, the draughts having a scouring and purifying effect. That trees have made modern streets healthier there can be no question, and that they have made them brighter and in all ways more delightful is equally a matter of fact and experience.

Vandals.

ANNUAL raids are made by railway companies upon English forests and commons, and nothing less than the most sleepless vigilance avails to keep the enemy at bay; but the attacks upon our woodlands are so persistent, insi-

dious, and remorseless that there is always a danger of a surprise. The general public, who are the most deeply interested in the small and diminishing number of open spaces in England, are not, in a general way, well read in the species of parliamentary literature which deals with railway projects, and many a dangerous Bill owes its defeat solely to the watchful efforts of the special defenders of public commons. Some signal instances of the discomfiture of unscrupulous speculators have occurred within the last few years. The pertinacity, however, of these commercial adventurers knows no bounds, and they come forward year after year with fresh and apparently increasing presumption, and with an apparently perennial supply of audacious hardihood. But railway aggressiveness, as exhibited in the persistent and remorseless attacks which are annually made upon the already too limited area of open spaces in England, received a sharp and decisive check by the overwhelming and humiliating defeat in the House of Commons, on Monday, March 12th, 1883, of the Bill of the Great Eastern Railway Company for encroaching upon and disfiguring Epping Forest for the construction of an unnecessary railway from Chingford to High Beech. In a House of 312 members the second reading of this Bill, which had naturally attracted a great deal

of public attention, was rejected by a majority of 148, or 230 against 82. The Author of this volume commenced the opposition to this objectionable Bill in the session of 1881, and took up a position of uncompromising antagonism to the powerful combination of a great Corporation and a great Railway Company; and, as the result of unintermitted labour, carried on during two months of 1881, had the satisfaction of securing the support of every influential section of the press, with the splendid result which has been indicated. As the whole London press of the day following the victory thus achieved for the public commented upon this noteworthy occurrence, it is unnecessary to refer to details with which the public are sufficiently familiar. In the remarkably vigorous article in which *The Times* recorded that the vote of the House of Commons had 'smashed, pulverized, and utterly destroyed the wanton attempt of the Great Eastern Railway Company' to ruin the seclusion of the most picturesque part of Epping Forest, the leading journal carried the public sympathy when it said that the vote would be hailed with satisfaction, not only for its immediate result in saving Epping Forest, but 'for its emphatic assertion of the principle that the mere pecuniary interests of a railway company are not to be granted precedence over the rights and interests, the sentiments, tastes, and feelings, of the public at large.'

Walking-Sticks.

THE woods for a large number of those useful companions of pedestrians, Walking-sticks, come to England from other countries, and are received under various names, some of which will be familiar, whilst others will probably not be recognized. Most of the wood comes to England for manufacture, and the number of ready-made sticks imported is very small. England may therefore be considered as a country of Walking-sticks. The woods and countries are given by the manufacturers in a list, an alphabetical arrangement of which we give below. From Algeria come Bamboo, Bay, Caroubier, Chestnut, Cork, Date Palm, Eucalyptus, Juniper, Lemon, Myrtle, Nana Cane, Olive, Orange, and Pomegranate; from Australia, Bramble Cardwell, Loya, Midgen; from Borneo, Rajah; from China, Whampoa, Bamboo, Beetle Cane, Doghead Cane, Carolina Reed and Tonquin, and Whangee; from England, Ash, Birch, Blackthorn, Cabbage (Jersey Cabbage), Cherry, Crab, Dogwood, Furze, Guelder Rose, Hazel, Holly, Hornbeam, Maple, Mountain Ash, Mullen, Oak, and Whitethorn; from Penang, Penang Lawyer; from Siak, Malacca; from the West Indies, Bamboo, Black Torck, Briar, Coffee,

Ebony, Gru-gru, Lemon, Myrtle, Orange, Pimento, Soapwood, Supple Jack, and Yellow Sanders. Besides these, there come Bakow and Root Rattan from Singapore; Jungle from Java; Zephyr from the East Indies; Tea Tree from China; Scented Cherry from Hungary; Assyrian Thistle from Smyrna; Black Jacks from South Carolina; Nanny Berry and Hickory, also from America; and Medlar from France. Further there are to be mentioned certain hard woods such as Ceylon Ebony, Macassar Ebony, Partridge Wood, Rosewood, Snake Wood, and Thuya Wood. The largest British manufacturers of walking and umbrella sticks are Messrs. Henry Howell and Co., of 180, Old Street, City Road, London, to whose courtesy we are indebted for the interesting list we have given of Walking-sticks.

Walnuts.

THE productiveness of this most fruitful and useful tree increases with its age and size. In England, though there are many fine and productive specimens, they can scarcely compare in

size and fruitfulness with those which grow in the eastern parts of Europe. In the Crimea, near Balaclava, there is a Walnut Tree which is said to be a thousand years old, and which annually furnishes no less than eighty thousand, and sometimes as many as a hundred thousand nuts. The produce is shared amongst five Tartar families.

Wax.

NOT bees only, but plants secrete Wax. Amongst these useful vegetables is the Wax-tree of Japan, from which candles are made. It is largely grown in that country, and attains the height of about twenty-five feet, with a circumference of three feet. It is from its berries, which are produced about the third year, that the Wax is obtained. These berries are white, about the size of small peas, and they grow in clusters. The Wax is a thick natural growth on the outside of the berries, which, to obtain it, are washed, steamed, put in bags, and pressed. Perhaps the best way of obtaining it, however, is to boil the berries after

bruising, and then to skim the Wax from the surface of the water. The colour of this product, when obtained, is yellowish white, and it is said to be softer than beeswax. To melt it, 127° of heat are required. The light it gives when burnt is clear and good; but the Wax is used for other purposes than lighting, namely, for waxing thread, and also for giving a gloss to linen. As an article of commerce it forms a considerable source of profit to the growers; there is a brisk demand for it, and it obtains a high price.

Weeping.

IT is no more possible to account for the peculiar and graceful pendulousness that causes the descriptive appellation of 'Weeping' to be applied to trees, than it is to account for the infinite variations which distinguish one species of plants from another. But the Chinese are said to be able to 'manufacture,' so to speak, Weeping Trees, and the description of the process that will make them 'weep' is one that may interest many people, who will perhaps venture to try the experi-

ment. Two seedling trees having been planted, and allowed to become established, side by side, the top of one is bent down and 'inarched' upon the other, or grafted upon it near its base—the stem of the plant grafted on remaining rooted. When the graft has properly taken, the root of the bent sapling is pulled out of the ground and held aloft in its reversed position, whilst the stem of the other tree is cut off just above the point of junction. There should then be a little shading from the sun until branches have been formed, after which, it is alleged, the tree becomes a Weeping Tree.

Willows.

THE beneficial effects of planting Eucalyptus trees in malarial marshy districts are well known, but this sanatory influence has not been generally known to follow the planting of Willows. Some years ago, however, the Swedish consul at Mahazik, writing to *The Times*, confirmed a statement by a previous *Times* correspondent, that the planting of Willows in districts affected by malaria

produced most important results. He said: 'Before the *Eucalyptus* was even heard of in Asia Minor, I had seen the bark of the Willow used as a febrifuge. I had remarked the easy and inexpensive reproduction of this tree, its quick growth in damp places, its excellent qualities for fuel and for agricultural implements, and its great advantages for strengthening the banks of capricious streams, and had thence taken every opportunity after the winter floods to stick Willow cuttings along the banks of streams and in other damp places in my property; also to scatter Plane Tree seeds in marshy places. The result has been that, whereas twenty years ago the full-grown trees in this neighbourhood might have been counted, a luxuriant growth of Willows and Plane Trees marks my place, fuel is abundant, fever is steadily decreasing, the meandering propensities of my streams are checked, my neighbours have to come to me for agricultural implements, and I have not far to go for timber for all rough purposes.' Though Willows sometimes are seen of a large size, they cannot compare in this respect with many other trees. But in 1878 a respondent, Mr. Murray Finch Hatton, writing from Haverholme Priory, Sleaford, to *The Journal of Forestry*, gave some remarkable dimensions of a Huntingdon Willow (*Salix alba*) growing in his neighbourhood. They were as follows:—Height,

60 feet; spread of branches, 213 feet; circumference of roots, 40 feet 10 inches; circumference at five feet from the ground, 20 feet; circumference where the branches spring, 26 feet 6 inches.

Wood Bread.

THOUGH by far the largest number of our trees are non-poisonous, and a large number contribute their fruit to our stores of food, little advance has been made in the direction of turning their wood into bread. A certain German 'professor' did once try. He sawed the selected wood into very small pieces, beating them to fibres in a pounding apparatus, mixing with them the sawdust. By boiling and soaking and further beating, drying and pounding, and grinding and baking, all unsavoury flavours were eliminated. But this treatment having apparently succeeded in extracting *all flavour*, certain decoctions of vegetable substances, such as those of linseed, lime bark, and mallow stalks, were added. Then the 'wood flour' was baked into cakes; and when browned, these

were again broken up and ground into flour. The harder the wood experimented upon the more elaborate the process of pounding and grinding, and sometimes it was necessary to add a 'leaven' of wheaten flour and new milk, etc. Fifteen pounds of Beechwood, for instance, with some twenty pounds of 'leaven,' made, the professor averred, thirty-six pounds of good bread. Hardly wishing to try it himself, even after this marvellous process, he first tried it on a dog and then on some pigs. No injurious result following, he and his family thereupon launched upon a course of soup, dumplings, pancakes, and gruel made from this Wood Bread manufacture. What great possibilities of food production there may be in this idea, time perhaps may prove.

'Wooden Walls.'

BY the use of iron in the present ironclad period, the demand of the English navy for oak has greatly diminished, and it is interesting to recall the circumstances of that demand during the three hundred years preceding the present century,

and to revert to figures which prove the rapid increase in the tonnage of the British navy in that period. As Oak was almost the sole timber used, the recorded increasing tonnage of the British navy will show the increased consumption of Oak. In 1547 the tonnage was 12,455; in 1603, 17,110; in 1660, 57,463; in 1685, 103,558. By 1702 the tonnage had increased to 159,017; in 1714 it was 167,171; in 1727, 170,862; in 1760, 321,014; and in 1788, 413,667.

Yew.

HOW many people have wondered why Yews are so commonly found planted in churchyards! Various reasons have been put forward. One of these is the theory of protection to the sacred edifices—the tree, when large, affording a substantial shield to rough winds, and the denseness and permanence of the foliage making a wind guard or screen equally in winter and summer. Its slow growth—for it takes twenty years to attain a height of fifteen feet—is somewhat against this theory. But the fact that animals will not eat Yew

leaves, and insects will not infest them, offers a more probable explanation of the reason for planting so exclusive a tree in the immediate vicinity of churches, and one writer, Sir Thomas Brown (1605–1682), believed it was used as an emblem of the resurrection because of its perennial verdure. John Evelyn (1620–1706), mainly famous by his 'Diary' and his 'Sylva,' expressed the opinion that Yews were planted in churchyards to provide palms for Palm Sunday, the 'palms' being no other than branches of Yew. Probably the gloomy and funereal appearance of the tree, and also its adaptation for the art of topiary, or cutting into particular (prim, formal, and unnatural) shapes—shapes of birds and animals—had a good deal to recommend it in the eyes of those who selected it for church burying-grounds. The custom of so planting it, at any rate, is of ancient origin, and the Greeks and Romans used its branches as emblems of mourning. That the amenity of a churchyard would be largely preserved by the planting of Yew Trees, so far at least as the Yew itself is concerned, is proved by cases of the poisoning of animals that have browsed upon its foliage. One instance of this was recorded a few years ago, in 1877. A herd of seventeen cows, having been driven twenty-four miles, were placed for a night in an empty garden surrounded by Yew Trees. In the morning four of the animals were

dead, and three others died shortly afterwards, though the remaining ten of the number were not affected—probably from not having eaten, as animals usually will not eat Yew leaves. The bodies of the poisoned cows were found to be distended, their eyes dim, their nostrils charged with blood and mucus. Pieces of Yew were found in their stomachs, clearly proving the cause of poisoning. Yet it has been contended that fresh leaves of Yew do not poison animals, but only leaves that are in a half-withered state, and many instances have been given in proof of this allegation; one case to which our attention has been called being that of cattle and sheep which were lost to their owner through their eating half-withered Yew prunings which had been left in a field in which they were feeding. Animals, it is said, however, may become accustomed to Yew leaves by taking them first in small and then in gradually increasing quantities, and mixed with other fodder; and it is curious to note that though the leaves are poisonous the berries are innocuous. But it is believed that the stony seeds in the berry, immersed in the pulp, are poisonous, and that those persons, including children, who in eating the berries have inadvertently swallowed the stones, have been poisoned, and have, in some cases, died, as the immediate result of eating them. Donkeys have frequently, it is said, been poisoned by eating

Yew leaves, especially from eating partly dried leaves. Deer have been killed, it has been affirmed, by eating Yew leaves, and it has also been stated that branches thrown into a pond have stupefied the fish in it. Indeed, it is believed that the use of the Yew in connection with archery had a double object in ancient times, for, besides making bows of the wood, the arrows were steeped in a decoction of the leaves to poison the flesh of enemies. Taxica was a name given by the ancients to poison, and gave rise, it is urged, to the botanical generic name of *Taxus* given to the Yew. The word *taxine* is still used to indicate the substance which gives its poisonous property to this tree.

THE END.

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My Ladye and Others: Poems: Satirical, Philosophical, and Arcadian: By J. W. GILBART-SMITH, B.A., Christ Church, Oxon. Second Edition. LONDON: Field & Tuer, The Leadenhall Press, E.C. [Ten-and-Sixpence.

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Bartolozzi and his Works. (Dedicated by permission to Her Majesty the Queen), Biographical, Anecdotal and Descriptive. By Andrew W. Tuer. LONDON: Field & Tuer, The Leadenhall Press, E.C. *For illustrated edition of Bartolozzi and his Works, see* "Illustrated." [Six Shillings.

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the hitherto unpublished narrative of the pilgrimage of Sir Richard Torkington to Jerusalem in 1517. Edited by W. J. LOFTIE, B.A., F.S.A. Author of "A History of London," &c., &c. LONDON: Field & Tuer, The Leadenhall Press, E.C. [One Shilling.

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A COLLECTION of essays, letters, anecdotes, and verses, serious, comic, and serio-comic, by various hands, about tennis and lawn-tennis, with the rules of the latter game. Useful information and critical remarks are mixed with much genuinely amusing matter.

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AN attempt at a dispassionate and rational appreciation of the distinguished actor's merits and defects. Shunning "Irving-mania" and "Irving-phobia" alike, the author seeks to moderate the transports of indiscriminating worshippers, while at the same time combatting the prejudice of bigoted unbelievers. Neither a lampoon nor a panegyric, but in short a "critical study."

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is the Best Print for the Eyes? By JAMES MILLINGTON. With an Introduction by R. BRUDENELL CARTER, F.R.C.S. (Illustrated.) LONDON: Field & Tuer, The Leadenhall Press, E.C. [One Shilling.

IN a little compass the author has gathered together much valuable information on the eyesight, and he points out the injurious effects of premature and excessive literary work, and suggests such modifications of paper and print as will enable the greatest amount of work to be done with the least possible fatigue to the eyes. The introduction by R. Brudenell Carter is most interesting and suggestive.

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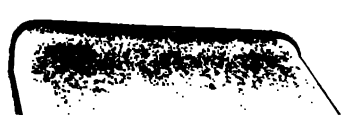

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